

The Effects of Retention Control Training and the Urine Alarm on
Nocturnal Enuresis and Attributions for the Therapeutic Outcome

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ABSTRACT

Nocturnal enuresis is one of the most common and pervasive childhood problems. Without effective intervention, the child's nocturnal enuresis may persist. This may result in possible distress and even psychological problems in the child. The current study had two aims. The first aim was to examine the effectiveness of retention control training, and the urine alarm if necessary, as an intervention for primary nocturnal enuresis. The second aim was to explore children's attributions for the therapeutic outcome of the intervention method regarding their nocturnal enuresis. The first aim was important, as previous research has revealed contradictory findings. The second aim was also important, as to date, research has neglected to explore this topic. Six children aged 8 to 12 years and their primary caregivers participated in the current study. Attribution data was obtained at three intervals through one-on-one semi-structured interviews between the researcher and child. Results found that with retention control training: one child achieved nocturnal urinary continence, three children decreased the number of their wet nights, and two children failed to respond. The addition of the urine alarm enabled three more children to achieve nocturnal urinary continence. In terms of attributions, results found that brief psycho-education appeared to have influenced these children's attributions. However, overall attribution findings suggested that children perceived researcher assistance, unknown factors, and the techniques used in retention control training to have influenced their success in the achievement of nocturnal urinary continence. These results would help to inform general practitioners and psychologists in terms of intervention recommendations for evidence-based practice, and future research.

GLOSSARY

Nocturnal enuresis. A condition whereby a child has never achieved a period of night-time urinary continence greater than 6 to 12 months.

Primary enuresis. Never having achieved urinary continence.

Secondary enuresis. The development of enuresis after a period of urinary continence, typically 6 to 12 months.

Retention control training. A daytime intervention method for the management of nocturnal enuresis, where a child is asked to drink liquids and withhold urination for increasing lengths of time.

Maximum functional bladder capacity. The volume of urine that a child can retain before voiding.

Urine alarm. A device that has been designed to buzz or vibrate when a child begins to void urine whilst asleep.

Wet. Documented for each night that the child's urine is voided into their bed, in which the child may or may not have awoken in response to the urine alarm.

Dry. Documented for each night that the child awakens in the morning with dry undergarments and a dry bed.

Nocturnal urinary continence. The ability to control one's bladder during sleep. The dryness criterion is usually defined as 14 consecutive dry nights.

CHAPTER 1

INTRODUCTION

Nocturnal enuresis is a term used to describe an involuntary voiding of urine during sleep (Butler, 2001). It has been reported that nocturnal enuresis is one of the most common childhood problems encountered by paediatricians (Goin, 1998). In addition, enuresis has been identified as the most persistent and stressful complaint by parents in children's medical care (Steele, Elkin, & Roberts, 2008). Owing to this, several interventions have been developed in order to manage nocturnal enuresis. Furthermore, many children are taken by their parents to see general practitioners and psychologists in order to manage their nocturnal enuresis, and are frequently offered an intervention method to undertake. Often, the child's nocturnal enuresis is consequently managed, although sometimes it is not, and nocturnal enuresis persists.

The current study had two aims. The first aim was to examine the effectiveness of retention control training for the management of primary nocturnal enuresis in six 8 to 12 year-old children. Retention control training is an intervention that aims to increase the child's maximum functional bladder capacity, with the suggestion that this will result in the management of nocturnal enuresis (Kimmel and Kimmel, 1970). It involves increasing the child's liquid intake and then asking them to withhold urination for increasing lengths of time (Carr, 1999; Muellner, 1960). There are several reasons for examining retention control training more extensively, these are:

Retention control training has often been researched in conjunction with other interventions (e.g., Azrin & Thienes, 1978; Bennett, Walkden, Curtis, Rees, Burns, Gosling,

& McQuire, 1985; Bollard & Nettelbeck, 1982; Geffken, Johnson, & Walker, 1986; Houts, Peterson, & Whelan, 1986; Luciano, Molina, Gomez, & Herruzo, 1993). Therefore, it is difficult to ascertain its direct effects. In addition, there appears to be much variability in efficacy findings over time. Much earlier research (e.g., Kimmel & Kimmel, 1970; Miller, 1973; Paschalis, Kimmel, & Kimmel, 1972) had found retention control training to be effective, whereas later research (e.g., Develin & O’Cathain, 1990; Fielding, 1980; Harris & Purohit, 1977) had found it to be ineffective. In addition to the variability in efficacy findings, intervention length has varied considerably across previous research, and is much shorter than the standard intervention length for other common interventions such as the urine alarm (e.g., 5 to 12 weeks) (Doleys, Ciminero, Tollison, Williams, & Wells, 1977) and full spectrum home training (e.g., 8 to 16 weeks) (Mellon & McGrath, 2000). Due to efficacy and intervention length inconsistency, as well as the fact that it has often been researched in conjunction with other interventions, it is important to examine the effectiveness of retention control training as an independent intervention, employing an increased intervention length and an exploration of variables that influence success. This would help to inform general practitioners and psychologists in terms of intervention recommendations for evidence-based practice.

Retention control training is largely conducted by the child and is therefore much more under the child’s control than the urine alarm, which is instituted and monitored by parents. There are therefore, benefits for using retention control training if it is effective. It may increase children’s sense of efficacy, and improve relationships with parents regarding nocturnal enuresis, which are often strained (Warzac & Friman, 1994). Given the distress caused by nocturnal enuresis, evident in both children and their parents (Foxman, Valdez, &

Brook, 1986), retention control training as an intervention may not only benefit the children's nocturnal enuresis, but other aspects of their life. If it is effective in the management of nocturnal enuresis, then this consideration alone may render it to be the intervention recommended.

Researchers agree that the urine alarm appears to be the most effective intervention for nocturnal enuresis (Brown, Pope, & Brown, 2011). Therefore, in the current study, the urine alarm will be offered to participants for whom retention control training-only is ineffective. This is to ensure that the participants have access to a well-established intervention.

The second aim of the current study was to explore these children's attributions about the therapeutic outcome of the intervention method regarding their nocturnal enuresis. Many qualitative studies have examined children's: self-esteem, self-concept, locus of control, and general feelings regarding their nocturnal enuresis. However, to date, both nocturnal enuresis and attribution research has failed to examine children's attributions about the therapeutic outcome of the intervention method regarding their nocturnal enuresis. The researcher believes this to be a significant oversight, and aims to explore this. These children's attributions will serve to illuminate children's perceived influences towards their success or failure in the management of their nocturnal enuresis. Particular attention will be given to any changes observed throughout the baseline and intervention phase in light of the different nature of retention control training and the urine alarm.

The following research questions will be addressed in the current study:

1. What is the effectiveness of retention control training for the management of primary nocturnal enuresis in 8 to 12 year-old children?

2. If retention control training is ineffective, what is the effectiveness of implementing the urine alarm with retention control training for the management of primary nocturnal enuresis in 8 to 12 year-old children?
3. What are these children's attributions for the therapeutic outcome of the intervention method regarding their nocturnal enuresis?

CHAPTER 2

LITERATURE REVIEW

Description of Nocturnal Enuresis

According to the American Psychiatric Association (2000), The Diagnostic and Statistical Manual of Mental Disorders 4th edition, text revision (DSM-IV-TR) states that a child must meet the following four criteria in order to be diagnosed with clinical enuresis: (a) repeated daytime or night-time urination into clothing or bedding; (b) enuretic episodes at least twice per week over the course of at least three months, or clinically significant impairment or distress in: academic (occupational), social, or other important areas of functioning; (c) be at least 5 years of age, or have attained the equivalent developmental level; and (d) voiding behaviour that is not exclusively due to the physiological effect of a substance (e.g., a diuretic) or medical condition (e.g., spina bifida, diabetes, or a seizure disorder). In addition, the DSM-IV-TR categorizes enuresis into three types: nocturnal-only type (i.e., occurring only during sleep), diurnal-only type (i.e., occurring only during the daytime), and nocturnal and diurnal type (i.e., occurring during both sleep and daytime) (American Psychiatric Association, 2000).

Researchers also differentiate between primary and secondary enuresis. Primary enuresis is identified where enuresis has been present since the child's birth, whereas secondary enuresis is identified where enuresis has developed after a period of urinary continence (Carr, 1999). For a child to receive a diagnosis of secondary enuresis, the generally-accepted period of urinary continence required is between 6 and 12 months (Mikkelsen, 2001). Medical subtypes of nocturnal enuresis include monosymptomatic enuresis, which does not include

bladder dysfunction, and polysymptomatic nocturnal enuresis, which does (Kajiwara et al., 2006). Primary enuresis is typically monosymptomatic, whereas secondary enuresis is typically polysymptomatic (Scharf, Pravda, Jennings, Kauffman, & Ringel, 1987). Moreover, distressing events (e.g., parental separation) appear to be associated with secondary nocturnal enuresis (Järvelin, Moilanen, Vikeväinen-Tervonen, & Huttunen, 1990). Monosymptomatic primary nocturnal enuresis is the focus of the current study because it is a straightforward presentation without complexities.

Prevalence

Researchers have defined enuresis as the most chronic and widespread childhood problem (Butler, 1998; Warzac & Friman, 1994). It has been suggested that nocturnal enuresis occurs more frequently in males than females, with a prevalence rate in 5-year-olds of 7% and 5% respectively (American Psychiatric Association, 1994). However, at 10 years of age, the prevalence rate for males and females drops to 3% and 2% respectively (American Psychiatric Association, 1994). Similarly, it has been suggested that the prevalence rate of nocturnal enuresis reduces with age, where it is prevalent in between 1% and 2% of young adults (Feehan, McGee, Stanton, & Silva, 2008).

The Urinary System and Bladder Control

A diagram of the urinary system is displayed in Figure 1. Moreover, a summary by Warzak and Friman (1990) describes bladder functioning as follows: The urinary bladder is located in the lower abdomen and functions as a collection vesicle. The bladder is composed of the detrusor muscle, which surrounds the vesicular structure of the bladder, and the sphincter muscle, which surrounds the neck of the bladder. As the bladder fills with urine,

stretch receptors in the neurological system are stimulated, and the detrusor muscle then contracts as the bladder neck begins to descend. The contraction of the detrusor muscle enables urination to occur as this stimulates relaxation of the sphincter muscle. Activation of the sphincter muscle keeps the sphincter closed, the detrusor muscle relaxed and the bladder neck ascended, which prevents urination from occurring.

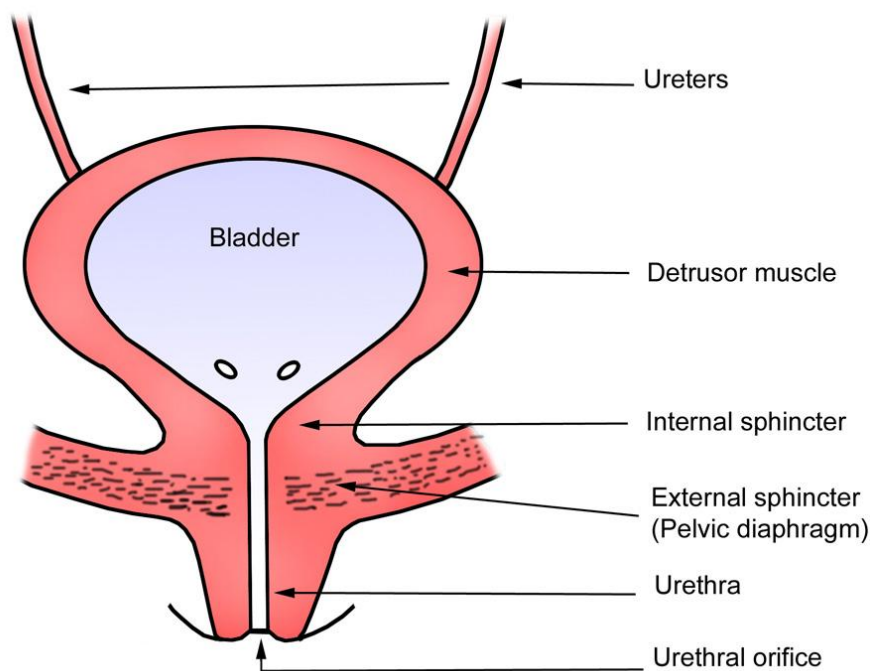


Figure 1. Diagram of the urinary system. Sourced with kind permission from: <http://emedicine.medscape.com/article/1949017-overview>

Furthermore, volitional bladder control has been described as a complex skill requiring neurological maturity (Maizels, Rosenbaum, & Keating, 1999). This neurological maturity is typically attained between the ages of 2 and 5 years (Maizels et al., 1999). A child who has achieved this neurological maturity is able to contract the sphincter muscle while simultaneously inhibiting contraction of the detrusor muscle, thus preventing urination from occurring (Maizels et al., 1999). These children are able to void through the reversal of this

process (i.e., by simultaneously releasing the sphincter muscle and contracting the detrusor muscle) (Maizels et al., 1999). However, medical authorities agree that bladder control is considered a medical or behavioural problem if it persists after 5 years of age for females and 6 years of age for males (Warzak, 1993). Furthermore, it is hypothesized that children with nocturnal enuresis do not perceive the signal of a full bladder, and the bladder is emptied automatically without inhibition (Mellon & Houts, 2006).

Etiology

Etiological factors that may contribute to the presence of enuresis have been explored in literature. Yet research has not revealed one clear etiology (Byrd, Weitzman, Lanphear, & Auinger, 1996). Three etiological factors that may contribute to nocturnal enuresis have been identified by Nevéus et al. (2000). These are: 1) excessive nocturnal urine production, 2) instability in bladder functioning, and 3) disorder of sleep.

Excessive nocturnal urine production. Enuretic children tend to produce urine in excessive amounts at night time (Butler, 1998; Warzac & Friman, 1994). Research has identified an abnormally-low level of the antidiuretic hormone vasopressin, or an abnormal re-absorption of electrolytes in the renal system, as physiological causes of excessive nocturnal urine production in some enuretic children (Butler, 1998). Furthermore, a study by Byrd, Weitzman, Lanphear and Auinger (1996) found enuretic children to be deficient in vasopressin secretions, resulting in the bladder producing 3 to 4 times the normal volume of urine. This rationale led to the development of antidiuretic medications such as desmopressin, for the management of nocturnal enuresis (Nevéus et al., 2000).

Instability in bladder functioning. A low functional bladder capacity may also account for a child's nocturnal enuresis. Enuretic children have been suggested to have a low functional bladder capacity with a strong urge to void urine at low bladder volumes and pressures (Bloomfield & Douglas, 1956; Muellner, 1960; Stalker & Band, 1946; Warady, Alon, & Hellerstein, 1991). An explanation by Yates (1970) suggested that this strong urge to void urine at low bladder volumes and pressures is due to ineffective detrusor muscle activity. Yet, some scientists have disputed this, reporting that the bladder capacity of an enuretic child does not differ significantly to that of a non-enuretic child (Butler, 1998).

Disorder of sleep. A review by Butler and Holland (2000) revealed nocturnal enuresis as primarily related to the child's inability to awaken to a full bladder. In addition, literature has stated that nocturnal enuresis is due to an inability to respond to bladder sensations during sleep (Butler, 1998). Furthermore, enuresis has been characterized as a type of sleep disorder by some researchers (Warzak & Friman, 1994). The view that enuretic children sleep so soundly or deeply that they do not awaken to bladder sensations has led to a multitude of studies being conducted, examining a possible contribution of sleep disorders to nocturnal enuresis (Butler, 1998; Warzak & Friman, 1994). However, much evidence to the contrary also exists (Butler, 1998). Recent electroencephalogram studies suggest that the sleeping patterns of enuretic and non-enuretic children do not differ, and therefore, do not seem to act as antecedents to nocturnal enuresis (Von Gontard, 1998).

In addition to these three etiological factors, the following factors have also been suggested to contribute towards the presence of nocturnal enuresis:

Familial history. Positive family history has been suggested to be a factor contributing to the presence of enuresis. A study found that more than 50% of children with primary

nocturnal enuresis have a family history of it in siblings or parents (Arnell et al., 1997). In addition, another study found as many as 70% of enuretic children to have a positive family history (Scharf et al., 1987). Furthermore, a child has been identified as 7 times more vulnerable to developing enuresis if their father experienced it, and 5 times more vulnerable if their mother experienced it (Järvelin et al., 1990; Warzac & Friman, 1994). However, a negative family history has not been found not to negate the possibility of nocturnal enuresis, although the probability is reduced to between 15 and 16% (Järvelin et al., 1990; Warzac & Friman, 1994).

Physical development. Physical and organic factors such as urinary tract infections, genitourinary abnormalities, diabetes, or sickle cell disease have been thought to account for enuresis in between 1 and 10% of enuretic children (Rajigah, 1996). In addition, research studies suggest a link between nocturnal enuresis and a maturational delay in the central nervous system, which reduces the enuretic child's ability to inhibit voiding of urine during sleep (Cendron, 1999; Hallioglul et al., 2001; Kawauchi et al., 1998). Some studies also suggest that enuretic children have a general physical developmental delay (Mikkelsen, 1991; Ronen & Abraham, 1996), evidenced by the spontaneous achievement of nocturnal urinary continence as enuretic children age (Cendron, 1999).

Psychosocial factors. Psychosocial factors have also been suggested to contribute towards the presence of nocturnal enuresis. It has been thought that an enuretic relapse may occur because of the stress caused by adverse life events such as: parental job loss, separation of parents, or death in the family (Devlin & O'Cathain, 1990; Järvelin et al., 1990). In addition, researchers have suggested that the more negative life events a child experiences, the higher their likelihood of developing enuresis would be (Järvelin et al., 1990).

Psychosocial Implications

Although findings are often contradictory, research has revealed: psychological, behavioural, and cognitive factors, which may be associated with enuresis. Early researchers believed that psychological problems resulted in enuresis, however, current literature has found that psychological problems are often the consequence of enuresis, rather than the cause (Rajigah, 1996; Warzak, 1993). Most children have been found to experience negative social and emotional consequences because of their enuresis (Warzac & Friman, 1994). For example, qualitative studies have found: shame, guilt, humiliation, and an avoidance of social activities to be experienced by 9-year-old children with nocturnal enuresis (Butler & Heron, 2008). In addition, enuretic children may be ostracized by their peers, excluded from school, and develop conflictual relationships with their parents (Carr, 1999). These problems are of concern to psychologists, as they may lead to the child developing: low self-esteem; academic problems; and emotional or conduct problems (Carr, 1999). Moreover, research has revealed self-esteem (Hägglöf, Andrén, Bergström, Marklund, & Wendelius, 1997) and self-concept (Moffatt, Kato, & Pless, 1987) to improve following the management of nocturnal enuresis. This further supports the suggestion that emotional problems are often a consequence of nocturnal enuresis, as opposed to a cause.

It has been suggested that many children are upset by the experience of having nocturnal enuresis, as well as by the reaction of other people (Longstaffe, Moffatt, & Whalen, 2000). The social life of these children may be restricted due to the avoidance of sleepovers, camps, and school because of their nocturnal enuresis (Du Mars, 1999). It has been found that enuretic children are distressed by a fear of detection by their peers (Warzak, 1993). In addition, the social consequences of being discovered as a bed-wetter are thought to increase

with age, and with more opportunities for social interactions, such as sleepovers (Butler, 1998; Warzac & Friman, 1994). Consequently, Du Mars (1999) suggested that enuretic children are likely to be criticized and/or punished because of their nocturnal enuresis, resulting in a negative self-image. Researchers suggest that parents may become frustrated with their child's enuretic behaviour and may punish them in an attempt to modify this perceived misbehaviour, negatively affecting future parent-child interactions, and resulting in physical and/or emotional abuse at the extreme (Warzac & Friman, 1994). The resultant social isolation and academic failure has been thought to interfere with normal development, implicating the necessity for early intervention and not simply leaving the children to outgrow it (Butler, 2004; Du Mars, 1999).

Despite these findings, recent studies indicate that nocturnal enuretic children present as well adjusted and/or unconcerned regarding their nocturnal enuresis (Butler, 1998). Nevertheless, enuretic children have also been found not to openly display or express such emotional problems (Butler, 1998; Warzac & Friman, 1994).

Assessment

In terms of the assessment for nocturnal enuresis, it is good practice firstly to arrange a medical examination by a general practitioner to rule out any physical causes accounting for enuresis, such as: a urinary tract infection; diabetes; urethral valve abnormalities for males; uterine abnormalities for males and females; and spinal cord defects (Cendron, 1999). In addition, a medical family history would help to rule out a family history of kidney problems or diabetes (Mellon & Houts, 2006).

Following the medical examination, psychological assessment would determine whether the child and his or her parents are willing and able to implement intervention, as it may be relatively demanding (Mellon & Houts, 2006; Steele et al., 2008). As most children and their parents are highly motivated to manage the nocturnal enuresis, and are often described as psychologically-normal, psychometric assessments of personality and cognitive functioning are not typically required (Mellon & Houts, 2006). However, negative parental attitudes have been shown to reduce the cooperation needed to implement behavioural intervention thoroughly (Morgan & Young, 1975). Therefore, a sound clinical judgement is required. Furthermore, although most parents are tolerant regarding their child's nocturnal enuresis, some parents are intolerant and punitive, which must be remedied prior to implementing intervention (Steele et al., 2008).

The child's pattern of wetting may be recorded before implementing intervention (Carr, 1999). This data gathered during the baseline phase may therefore be useful to evaluate progress throughout intervention (Carr, 1999).

Interventions

Techniques developed to manage nocturnal enuresis have predated modern civilization. For example, techniques have included: buttock and sacrum burning, penile binding, and forced urine-saturated pyjama-wearing (Glicklich, 1951). These techniques were abandoned in the early 20th Century, although enuretic children often remained subject to negative social consequences, isolation, and stigma (Steele et al., 2008). Numerous interventions to manage nocturnal enuresis have since been developed for use today. Behavioural, pharmacological, and a range of other interventions are commonly used for children with nocturnal enuresis (Glazener, Evans, & Peto, 2004). The management of nocturnal enuresis (or the achievement

of nocturnal urinary continence) has been defined as 14 consecutive dry nights, representing the dryness criterion (Butler, 1991). Therefore, the intervention would typically be stopped once the dryness criterion has been reached. Without intervention, it has been estimated that 46 to 90% of children with nocturnal enuresis will eventually become continent, although complete nocturnal urinary continence may take several years (Rajigah, 1996). This section outlines the variety of interventions available for the management of nocturnal enuresis today, with a focus on behavioural interventions, particularly, retention control training and the urine alarm.

Behavioural interventions. Behavioural research has guided theories that emphasise the learned nature of night-time urinary continence (Doleys, 1977). Previous reviews have found behavioural interventions to be more effective (Yates, 1970), less costly, have lower relapse rates, and be without the side effects of pharmacological interventions (Du Mars, 1999). Yet, its success has been argued to rely greatly on the child's motivation and investment to follow-through with intervention (Devlin & O'Cathain, 1990).

Night-lifting. Night-lifting involves parents waking the child from sleep to urinate in the toilet, although experts suggest it to be a form of punishment for both parents and children (Du Mars, 1999). In addition, it has been suggested to be counterproductive as the child is not given the opportunity to learn the sensation of a full bladder (Butler et al., 1994; Glazener et al., 2004). Yet a review of interventions for nocturnal enuresis has found night-lifting to result in significantly fewer wet nights and higher rates of nocturnal urinary continence (Glazener & Evans, 2009).

Reward systems. Reward systems use positive reinforcement in order to encourage a desired behaviour (Glazener et al., 2004). Achievable goals such as getting up to go to the

toilet or remaining dry all night are rewarded, once attained (Glazener et al., 2004). The positive reinforcement for dry nights may reduce a negative emphasis on wetting (Glazener et al., 2004). However, reward systems must be used with care, as a child may feel failure when the reward is not attained (Glazener et al., 2004). In a review of interventions for nocturnal enuresis, when compared to controls, reward systems have been found to result in significantly fewer wet nights and higher rates of nocturnal urinary continence (Glazener & Evans, 2009).

Overlearning. Overlearning involves giving the child extra drinks at bedtime in order to cause additional stress to the bladder's detrusor muscle (Glazener et al., 2004). This has been suggested to increase the child's bladder capacity (Butler, 1998; Ronen & Abraham, 1996). However, the effectiveness of overlearning as an intervention for nocturnal enuresis has not been thoroughly researched.

Fluid restriction. In fluid restriction, children are discouraged from drinking liquids in the evening (Glazener et al., 2004). However, this has been thought to prolong nocturnal enuresis (Butler, 2004). The effectiveness of fluid restriction as an intervention for nocturnal enuresis has also not been thoroughly researched.

Stop-start training. The rationale for stop-start training is to strengthen the pelvic floor, which has been suggested to help the child to manage his or her nocturnal enuresis (Glazener et al., 2004). However, a study found only 16.6% of participants to have achieved nocturnal urinary continence with stop-start training, whereas the other two intervention groups including the urine alarm and dry-bed training had a success rate of 44.4% and 50%, respectively (Bennett et al., 1985).

Urine alarm. The urine alarm was introduced by Mowrer and Mowrer in 1938. Today the urine alarm consists of an alarm module attached by a wire to a urine sensor (Mellon & Houts, 2006). Alarm variations include a bell, buzzer, vibration, or light (Glazener et al., 2004). The urine alarm uses a sensing mechanism, which is activated upon urine contact while the child is asleep (Doleys, 1977). The urine alarm then sounds in order for the child to awaken and cease urination, to then turn the urine alarm off and complete urination in the toilet (Doleys, 1977).

Mowrer and Mowrer (1938) based the effectiveness of the urine alarm on a classical conditioning rationale. In this paradigm, the urine alarm (the unconditioned stimulus) startles the child awake (the unconditioned response) and contraction of the bladder sphincter inhibits urination (associated with the startle response) (Mowrer & Mowrer, 1938). The child then becomes ‘conditioned’ over time by responding to full bladder sensations (the conditioned stimulus) by awakening (the conditioned response) (Mowrer & Mowrer, 1938). However, the classical conditioning hypothesis as an explanation for the effectiveness of the urine alarm was countered by Lovibond in 1963. Lovibond (1963) reasoned that classical conditioning would predict that awakening (the conditioned response) would gradually weaken once the urine alarm (the unconditioned stimulus) is withdrawn. An instrumental avoidance paradigm was proposed, where the child learns: awakening, detrusor muscle relaxation, and sphincter contraction, to avoid the aversive stimulus of the urine alarm (Lovibond, 1963). In addition to the conceptualisations based on classical and avoidance conditioning, Butler and Stenberg (2001) suggested social reinforcement as the rationale for the urine alarm’s effectiveness, as parents often arouse the child from sleep upon wetting, or discover that the child has inhibited urination the next morning.

The urine alarm has been the intervention for nocturnal enuresis that has been the most thoroughly researched (Doleys et al., 1977). In addition, it has been consistently found to be the most effective intervention for the management of nocturnal enuresis (Brown et al., 2010). However, it has been suggested that the urine alarm acts as an aversive stimulus, startling the child when it sounds (Doleys, 1977; Houts, 2010). In addition, several studies have described the alarm sound as the most disturbing and common problem of the urine alarm (Greaves, 1969; Neal & Coote, 1969). The urine alarm also requires the child and his or her parents to invest much time and energy into its implementation (Mellon & Houts, 2006). Other problems include: the cost, maintenance, and the child not awakening to the alarm sound (Doleys, 1977). Furthermore, training the child to awaken to the alarm sound within the first four weeks has been suggested to be demanding, especially as many children require parental assistance to do so (Houts, 2010).

Retention control training. Kimmel and Kimmel (1970) introduced an intervention for nocturnal enuresis called daytime retention control training. Retention control training was designed to increase the child's maximum functional bladder capacity, in order to manage the nocturnal enuresis (Doleys et al., 1977). In retention control training, the child is given liquid to drink at a preset time every day, and is asked to tell his or her parent when he or she wishes to urinate (Carr, 1999). At this point, the child's parent asks him or her to delay urination for 3 minutes (Carr, 1999). The child is then immediately reinforced following this retention interval by tokens and/or praise (Paschalis et al., 1972). The child's retention interval is increased by 2-3 minutes every day until he or she manages to withhold urination for 45 minutes, which is suggested to take 15-20 days (Paschalis et al., 1972). Where dry nights are

not achieved instantly, progress may be measured by increases in voided volumes of urine, and retention intervals.

It has been suggested that nocturnal enuretic children have, on average, smaller maximum functional bladder capacities than children without nocturnal enuresis (Harris & Purohit, 1977; Muellner, 1960; Starfield, 1967). This can result in excessive urination, in response to small amounts of urine (Muellner, 1960). Retention control training has been suggested to help children increase their maximum functional bladder capacity (Carr, 1999; Doleys & Wells, 1975). The rationale is that the bladder will not empty so early at night time if it can hold larger volumes of urine (Glazner et al., 2004). Furthermore, pediatric clinicians agree that retention control training helps to elongate the bladder detrusor muscles, resulting in the bladder's ability to grow and accommodate a larger volume of liquid at night time (Ronen & Abraham, 1996). Furthermore, decreases in night-time wetting episodes have been shown to result from increasing the child's maximum functional bladder capacity (Starfield & Mellits, 1968).

Initial research studies have indicated the effectiveness of retention control training, in terms of reducing wetting episodes or achieving nocturnal urinary continence (e.g., Doleys & Wells, 1975; Paschalis et al., 1972; Stedman, 1972). A study by Kimmel and Kimmel (1970) found two 4-year-old enuretic females who presented with almost daily night-time wetting episodes to have achieved nocturnal urinary continence following 7 days of retention control training, and following 14 days for a 10-year-old female. Furthermore, a study by Miller (1973) using an ABAB within-participant experimental design comparing retention control training with placebo found both participants to have achieved nocturnal urinary continence within 7 to 14 days of retention control training. However, it has been suggested that

retention control training as an intervention for nocturnal enuresis is not as effective as the urine alarm (Johnson, 1980). In addition, subsequent research studies have found it to be ineffective (Devlin & O’Cathain, 1990; Fielding, 1980; Harris & Purohit, 1977). Overall, it has been estimated that 50 to 75% of nocturnal enuretic children will improve with retention control training, and 30 to 50% will achieve nocturnal urinary continence (Lyman, Schierberl, & Roberts, 1988).

Paschalis, Kimmel and Kimmel (1972) have argued for more extensive testing of retention control training. For example, many research studies have studied retention control training in combination with other interventions (e.g., Azrin & Thienes, 1978; Bennett et al., 1985; Bollard & Nettelbeck, 1982; Geffken et al., 1986; Houts et al., 1986; Luciano et al., 1993). Furthermore, it has been combined with positive practice, cleanliness training, and differential positive reinforcement in dry-bed training (Azrin, Sneed, & Foxx, 1974; Azrin & Thienes, 1978; Doleys et al., 1977). Therefore, it is difficult to determine the effectiveness of retention control training as an independent intervention. In addition, a study has suggested that the discontinuation of retention control training once the 45-minute withholding period has been attained may have been premature for some children (Paschalis et al., 1972). The intervention length for retention control training in previous studies has been found to consist of: 15 to 20 days (Paschalis et al., 1972), 21 days (Doleys & Wells, 1975), 28 days (Fielding, 1980), and 35 days (Harris & Purohit, 1977). This intervention length is much shorter than the standard intervention length for other common interventions such as the urine alarm (e.g., 5 to 12 weeks) (Doleys, Ciminero, Tollison, Williams, & Wells, 1977) and full spectrum home training (e.g., 8 to 16 weeks) (Mellon & McGrath, 2000). Therefore, the intervention length in previous studies may not have been adequate in order to initiate change in the

children's nocturnal enuresis. Lastly, there appeared to be sufficient evidence to warrant further investigation of retention control training, where more well-designed studies were recommended (Doleys, 1977).

Dry-bed training. Dry-bed training was originally developed for use in adults with learning disabilities (Azrin, Sneed, & Foxx, 1973). These researchers created a detailed training programme, involving: (a) use of the urine alarm nightly, (b) positive practice (before bedtime and whenever the urine alarm sounds by urination), (c) retention control training, (d) cleanliness training, and (e) night-time awakening. It has been modified due to the difficulties in implementing this regime, for example, modified dry-bed training does not include the positive practice and reprimand elements (Butler, Brewin, & Forsythe, 1988). It has been criticized as being both complicated and time-consuming (Bonser, Jupp, & Hewson, 1990). Yet, it has been found to be an effective intervention for nocturnal enuresis (Azrin et al., 1974; Bollard & Nettelbeck, 1982; Doleys et al., 1977).

Full spectrum home training. Full spectrum home training is a multi-component program for the management of nocturnal enuresis designed by Houts and Leibert in 1984, composed of multiple procedures that are implemented simultaneously (as cited in Mellon & McGrath, 2000). It combines a urine alarm, with retention control training, cleanliness training, and over-learning (Glazner et al., 2004). A study by Houts, Peterson and Whelan (1986) found that participants in the full spectrum home training group who achieved nocturnal urinary continence did so significantly faster than those in the urine alarm plus cleanliness training group; and the urine alarm plus cleanliness training plus retention control training group.

Pharmacological interventions. Pharmacological interventions consist of: desmopression, tricyclic drugs (dothiepin, amitriptyline, doxepin, trimipramine, desipramine,

clomipramine, imipramine, lofepramine, protriptyline, and nortriptyline), drugs related to tricyclics (mianserin, viloxazine, and maprotiline), and a range of other drugs (e.g., diazepam, amphetamine, and oxybutynin) (Glazener et al., 2004). Pharmacological interventions have often been considered an attractive short-term intervention, as they generally take effect quickly (Houts, 1987; Mikkelsen, 1991; Warzak & Friman, 1994). In addition, 60% of children are given pharmacological interventions for nocturnal enuresis by general practitioners (Houts et al., 1994). However, research has indicated that relapses are common with pharmacological interventions (Von Gontard, 1998), and more children improve from behavioural interventions than pharmacological interventions (Houts et al., 1994).

Imprimine. Imprimine was the pharmacological intervention used most frequently prior to the availability of desmopressin (Foxman et al., 1986). Imprimine's effectiveness has been explained as reducing the bladder's irritability, resulting in less intense or less frequent bladder contractions (Scarf et al., 1987). However, severe cardiotoxicity may result without careful monitoring of imprimine dosages, therefore, the use of desmopressin has replaced imprimine, as it is thought to be a relatively safer medicine (Houts et al., 1994). Lastly, a study found that intervention outcomes begin to worsen, and nocturnal enuresis re-emerges with long-term imprimine use (Houts et al., 1994).

Oxybutynin. Oxybutynin is a smooth muscle relaxant, designed to target the detrusor muscles in order to reduce over-activity and to increase maximum functional bladder capacity (Kosar, Arikan, & Dincel, 1999). However, a double-blind study by Lovering, Tallett and McKendry (1988) found no evidence for the effectiveness of oxybutynin in 30 nocturnal enuretic children. In addition, potential side effects include: a dry mouth, constipation, and flushing (Butler, 2008).

Desmopressin. Desmopressin comes in the forms of: a tablet, nasal spray, or melt formation, taken just before bedtime (Rittig, Knudsen, Norgaard, Pedersen, & Djurhuus, 1989). Desmopressin has been described as a synthetic form of an antidiuretic hormone (Warzak & Friman, 1994). It acts as a diuretic, decreasing urine production, and increasing urine concentration, to decrease the likelihood of a wetting episode (Rushton, Belman, Skoog, Zaontz, & Sihelnik, 1995; Warzak & Friman, 1994). A review of 14 studies revealed a 70% decrease in the number of wet nights with the use of desmopressin, with 24.5% of 326 children across 11 studies having achieved nocturnal urinary continence (Moffatt, Harlos, Kirshen, & Burd, 1993).

Atypical interventions.

Acupuncture. The effectiveness of acupuncture as an intervention for nocturnal enuresis has not been thoroughly researched. However, a study used acupuncture to treat 50 nocturnal enuretic children who had not responded to pharmacological interventions, finding 86% of the children to achieve nocturnal urinary continence following 6 months of intervention (Serel et al., 2001). In addition, a study by Björkström, Hellström and Andersson (2000) evidenced a gradual increase in the number of dry nights per week, in 25 enuretic children.

Hypnotherapy. An extensive review by Mellon and McGrath (2000) of empirically-supported interventions included four research studies examining the efficacy of hypnotherapy as an intervention for the management of nocturnal enuresis. Within a maximum of six 1-hour sessions, 71.2% of enuretic children achieved nocturnal urinary continence (Mellon & McGrath, 2000).

Short-term psycho-therapy. Little research has investigated the efficacy of short-term psycho-therapy for the management of nocturnal enuresis. However, a study by Sacks, De Leon and Blackman (1974) found participants receiving 12 weekly sessions of psycho-therapy to have a success rate (defined as 13 consecutive dry nights) of 20%, as opposed to 22.2% for those receiving no intervention, and 79.7% of those using the urine alarm.

Motivational therapy. Motivational therapy involves reassuring the child and his or her parents, providing emotional support, and removing the guilt associated with nocturnal enuresis (Cendron, 1999). The child is instructed to take responsibility, and helped to understand that he or she does have a role in the management of his or her nocturnal enuresis, although he or she did not cause the problem (Cendron, 1999). Furthermore, the success rate of motivational therapy is suggested to be 25% (Cendron, 1999).

Predictors of Intervention Outcome

Research has identified several factors that increase the likelihood of intervention success. Morison, Tappin and Staines (2000) conducted a study examining individual and family characteristics that influence persistence with intervention and intervention outcome. This study found a nocturnal enuretic child's likelihood of a successful outcome to be increased by: (a) parent and child's readiness to implement intervention; (b) parent and child's expectation of success; and (c) parent and child's belief in the child's ability to achieve dryness (Morison et al., 2000). Similarly, co-operation with the clinician, a wish to resolve the nocturnal enuresis, good marital and family functioning, and positive parent-child adjustment are factors suggested to increase the probability that an intervention will be effective (Carr, 1999). Research has also suggested that intervention compliance and completion is influenced by the frequency of contact between the clinician, parent, and child

(Butler, 1998; Butler & McKenna, 2002). Furthermore, an extensive literature review by Butler and Stenberg (2001) identified factors which contribute to premature termination from intervention, including: (a) a family history of nocturnal enuresis, (b) maternal intolerance, (c) negative self-perception in child, and (d) child behaviour problems. A study of 127 enuretic children revealed the following factors as the most predictive of intervention failure: an absence of concern by child and parents; family stress, as related to marital discord; financial difficulties; unemployment; and death or serious illness in the family (Devlin & O’Cathain, 1990). Furthermore, a child’s low self-efficacy beliefs and learned helplessness that the wetting cannot be changed by him or her may maintain the enuresis (Carr, 1999).

Attributions for Therapeutic Outcome

Heider (1958) was the first social psychologist to identify the processes that individuals use to try to understand the causes of their own behaviour. Attribution theory suggests that individuals devise internal explanations (attributions) to explain their own successes or failures (Grimes, 1981). Heider’s early research in social psychology distinguished between attributing events to internal causes (i.e., due to some aspect of the self) and external causes (i.e., due to situational factors) (Hilt, 2004). Later, Weiner (1985, 1986) proposed that the basic dimensions that underlie an individual’s causal attributions include the following: internality (i.e., where the cause is located), controllability (i.e., the extent to which the cause is perceived as controllable), and stability (i.e., the degree to which the cause is either constant or fluctuates). Therefore, the explanations (attributions) that individuals make to explain their success or failure may be: stable or unstable; internal or external; and controllable or uncontrollable. The addition of the stability dimension enabled four possibilities in terms of the type of attribution an individual may make to a particular event:

internal and stable (i.e., personal ability); internal and unstable (i.e., personal effort); external and stable (i.e., task difficulty); and external and unstable (i.e., chance) (Weiner et al., 1971).

Internal and stable attributions for failure would reduce an individual's: motivation, self-esteem, and level of expectancy, whereas no such decrements in these conditions would result from making external and unstable attributions for failure (Weiner, Russell, & Lerman, 1979). A study by Stevens and Jones (1976) revealed a tendency for individuals to attribute success to internal factors, and failure to external factors, a phenomenon referred to as the self-serving attributional bias. Similarly, Kelley and Michela (1980) reviewed 12 studies regarding attributions for success and failure, and found that participants were more likely to make internal rather than external attributions for their own success. Lastly, Zuckerman (1979) summarized research findings relating to expectancies, and found that outcomes that are expected are attributed to ability and outcomes that are unexpected are attributed to luck.

In terms of attributions relating to nocturnal enuresis, one study explored parental attributions regarding their child's nocturnal enuresis. Butler, Brewin and Forsythe (1986) involved 68 mothers of children with primary or secondary enuresis as the participants. These mothers completed questionnaires and a tolerance scale regarding causes and concerns for the child's nocturnal enuresis (Butler et al., 1986). Results found a greater intolerance to be associated with attributions to causal factors that were controlled by the child (Butler et al., 1986).

It has been suggested that nocturnal enuresis is most effectively treated when children are taught that they are the locus of control (Griffiths, Meldrum, & McWilliam, 1982). Children undertaking retention control training are active learners where self-control and self-monitoring procedures are taught and the child can be taught that they can control their own

behaviour and take responsibility for their outcomes (Grimes, 1981). It has been hypothesised that individuals who believe that they are in control put forward more effort to the challenging task and behave in ways to make success more likely, which leads to the management of nocturnal enuresis (Morison et al., 2000). Retention control training aims to help children discover control over their bladder, rather than their bladder having control over them (Butler, 2004). In contrast, children have been suggested to assume a more passive role with the urine alarm (Turner, 1973). A study by Marshall, Marshall and Lyon (1973) explored the effect of passive versus active participant involvement on intervention outcome. Passive groups included the urine alarm, and active groups included responsibility and reinforcement. Retention control training involves the child's responsibility for recording and measuring voided urine volumes and reinforcement given by parents, therefore, it is suggested to involve responsibility and reinforcement. Results found a better improvement and a lower relapse rate in the active participants using responsibility and reinforcement (Marshall, Marshall, & Lyon, 1973).

Therefore, the second aim of the current study is to determine the content of these children's attributions regarding their success or failure in the management of their nocturnal enuresis with retention control training, and, if necessary the urine alarm. Children's attributions for therapeutic outcome of the intervention method regarding their nocturnal enuresis has not yet been explored, therefore, the current study aims to explore this.

CHAPTER 3

METHOD

Setting

The current study was conducted in two settings. The first setting was in the University of Canterbury's Health Sciences Centre clinic rooms, where interviews took place. The second setting was in the home of each participant, where retention control training practice sessions were carried out during the afternoon, and the urine alarm was used at night time.

Participants

Participants were six children ranging from 8 to 12 years of age, including one female and five males, and their primary caregivers. All children participated voluntarily, and met the DSM-IV-TR criteria for primary nocturnal enuresis. Child information is displayed in Table 1. Pseudonyms have been used to preserve the anonymity of the children.

Table 1

Child Information

Child's name	Age in years	Gender	Physical causes for nocturnal enuresis by doctor	Previously-tried treatment methods	Family history of nocturnal enuresis
Jane	9	Female	Nil	NL, RS	Mother
Nathan	10	Male	Nil	Desmopressin, DR, NL, CT, RS	Nil
Samuel	9	Male	Nil	FR	Nil
Thomas	8	Male	Nil	NL	Father
Simon	10	Male	Nil	FR, NL	Nil
Peter	12	Male	Nil	FR, NL	Father, uncle, and cousins

Note. NL = Night-lifting; RS = Reward systems; DR = Dietary restriction; CT = Cleanliness training; FR = Fluid restriction.

Recruitment and screening. This research study was approved by the Human Ethics Committee, University of Canterbury, on 24 July 2012 (see Appendix A for a copy of the approval letter). Following Ethics Committee approval, participant recruitment began in September 2012. A recruitment advertisement was included in the newsletter of seven primary schools in Christchurch (see Appendix B for a copy of the advertisement). Interested primary caregivers contacted the researcher by telephone, and an initial 5-minute screening interview was conducted to determine whether the child met the DSM-IV-TR criteria for primary nocturnal enuresis. Based on this screening interview, participants were selected on a first-come-first-served basis where the first eligible participants who made contact were invited to attend a more detailed interview in the clinic rooms, where further criteria were covered.

This interview between the researcher, the child, and the child's primary caregiver(s) ascertained information regarding the child's: nocturnal enuresis, history of nocturnal enuresis, and developmental history. Further information gathered included: family demographics, medical history, bedtime routines, and previously-tried treatment methods for the management of nocturnal enuresis. Once it had been established that participants had met the inclusion criteria, they were invited to participate in the current study. The intervention method was then outlined to the participants. They were given an information sheet describing the aims and procedures of the current study (see Appendices C and D for a copy of the information sheets), and the opportunity to ask the researcher any questions. Assent was obtained from the child, and informed consent was obtained from the child's primary caregiver(s) (see Appendices E and F for a copy of the consent forms). The participants were assured that they could decline or withdraw from participation at any stage without giving

any reason, and this was further addressed in the information sheet and consent form. The researcher asked that the primary caregiver(s) arrange a medical examination for the child regarding his or her nocturnal enuresis, if they had not already done so. Participants were asked to refrain from using any other treatment methods to manage the child's nocturnal enuresis for the duration of the current study, without discussing it first with the researcher. The researcher also asked that the child not wear diapers at bedtime for the duration of the current study. Lastly, the researcher asked primary caregivers not to enforce any punishment towards the child regarding his or her nocturnal enuresis for the duration of the current study. At the end of the interview, the first semi-structured interview between the researcher and the child then took place.

Inclusion criteria. The inclusion criteria for the current study were as follows:

1. The child met the DSM-IV-TR criteria for primary nocturnal enuresis.
2. The child was between 8 and 12 years of age at the beginning of the current study.
3. Participants agreed not to implement other treatment methods to manage nocturnal enuresis for the duration of the current study.
4. Participants agreed that the child would not wear diapers at bedtime for the duration of the current study.
5. Punishment would not be used towards the child regarding his or her nocturnal enuresis for the duration of the current study.
6. The primary caregiver(s) appeared to support the management of the child's nocturnal enuresis.

7. The child appeared to be engaged in the current study, and motivated to manage his or her nocturnal enuresis.
8. Participants agreed to record data daily and carry out the prescribed intervention procedures.

Exclusion criteria.

1. Participants were unable or unwilling to comply with the current study procedures.
2. There were more pressing family concerns other than the child's nocturnal enuresis evident upon assessment.

Experimental Design

A multiple-baseline across participants design was used for this study. Baseline lengths of 5, 10, or 15 days were randomly allocated. The independent variable in the current study was the intervention method. This consisted of retention control training, followed if necessary by implementation of the urine alarm. The dependent variable in the current study was the presence or absence of the child's nocturnal enuresis, as defined by the DSM-IV-TR criteria.

Measurement Instruments

Participants were provided with a baseline-recording sheet (see Appendix G), child and primary caregiver recording sheets (see Appendices H and I), water-load test sheets (see Appendix J) and a water-load test information sheet (see Appendix K). The primary caregiver recording sheets were used to ensure the reliability of child recording, and were to be completed by the child and his or her primary caregiver(s). All sheets were constructed by the researcher, and were administered prior to the intervention phase, and throughout

intervention as were necessary. The researcher collected completed recording sheets throughout the intervention phase as was necessary, and thanked the child and his or her primary caregiver(s) for their diligence and effort in completing them.

The researcher utilized semi-structured interviews to explore these children's experiences of nocturnal enuresis, and attributions for the therapeutic outcomes of the intervention method regarding their nocturnal enuresis. This structure allowed the researcher to identify emergent themes or concepts suggested by the children, and to explore these in more detail. The interviews were conducted at three intervals: 1) baseline, 2) post-retention control training, and 3) post-implementation of the urine alarm, or at the intervention end date if the child had not achieved nocturnal urinary continence. These interviews were either conducted in a clinic room, or in the child's home. Interviews were approximately 10 to 20 minutes in length and consisted of approximately 10 to 15 questions constructed by the researcher, which were individualized to suit the child and his or her progress (see Appendix L for a copy of the sample interview questions). Video recording equipment was used to record these interviews for accuracy, and in order for the information to be transcribed and coded into themes or concepts.

Measure

Water-load test. The water-load test was administered to each child at three intervals: 1) baseline, 2) post-retention control training, and 3) post-implementation of the urine alarm, or at the intervention end date if the child had not achieved nocturnal urinary continence. The water-load test and instruction sheets have been reproduced in Appendices J and K respectively. The water-load test was conducted to estimate the child's maximum functional bladder capacity (Starfield, 1967). Primary caregivers were instructed to give the child a

drink amounting to 30 ml/kg of his or her body weight, up to 500ml (Fielding, 1980). The child was asked to withhold urination for as long as possible, in response to requests to use the toilet (Fielding, 1980). Once the child could withhold urination no longer, the volume of urine voided was measured in a measuring jug (Fielding, 1980). This procedure was to be repeated until half of the drink volume was voided (Fielding, 1980). As a result, the largest volume of urine produced in a single void was regarded as the maximum functional bladder capacity (Fielding, 1980).

Interventions

Retention control training. Retention control training practice sessions were conducted daily in the afternoon, at the child's home. The child was asked to visit the toilet and urinate. The child was then given a drink amounting to 500ml. Once the child felt the urge to urinate, he or she was encouraged to withhold urination until his or her time goal had been achieved. A kitchen timer was used to signal when this length of time had passed. Once the child could postpone urination no longer, he or she used the toilet and voided urine into the measuring jug. The child's primary caregiver(s) would help the child to record: the exact time that the child ingested the drink, felt the urge to urinate, finally urinated, and the volume of urine voided. The length of time that urination had been postponed was then calculated. Following each practice session, the child's primary caregiver(s) would praise him or her for increases in retention intervals or voided volumes of urine, whilst making no comment for any decreases. At subsequent sessions, the child was encouraged to increase his or her time goal by 1 to 2 minutes, had he or she managed to postpone urination for the duration of the previous time goal for three subsequent sessions.

Urine alarm. The urine alarm was to be worn by the child nightly, when the child went to bed. Once the sensor was activated by urine contact, which would sound the alarm, the child was to awaken and disconnect the alarm from the cord attached to the sensor. If the child was unable to awaken to the alarm sound independently, the child's primary caregiver(s) would: awaken the child by saying his or her name, turning on the child's bedroom light, and then requesting the child to disconnect the alarm. The child was then asked to visit the toilet and urinate if possible, wipe the sensor clean with a soapy washcloth, change any garments as were necessary, re-connect the alarm, and return to bed.

Procedures

Baseline phase. Baseline lengths were written on folded pieces of paper, and drawn randomly from a container by each child. The baseline lengths consisted of 5, 10, or 15 days. The researcher administered participants with a baseline-recording sheet according to the assigned number of days, with a verbal explanation of how to complete it. The numbers of wet and dry nights were recorded for the assigned number of days. A baseline-recording sheet for 5 days has been reproduced in Appendix G. The researcher also administered a water-load test and information sheet, with a verbal description of how to complete it. These sheets have been reproduced in Appendices J and K respectively. The child was encouraged to be involved in the recording procedure, where primary caregiver(s) would assist him or her in the completion of these sheets.

Intervention phase. Following the baseline phase, the researcher conducted the first home visit to collect the baseline-recording sheet and water-load test sheet, and to discuss these with the participants. Participants were then provided with child and primary caregiver recording sheets (see Appendices H and I for a copy of the recording sheets), with a verbal

explanation of the retention control training procedure, and how the recording sheets were to be completed. Primary caregivers were asked to assist the child in completion of these sheets according to their ability, as there is some evidence to suggest a decrease in the number of wetting episodes with self-recording (Steele et al., 2008).

The researcher then provided the participants with psycho-education regarding bladder control and nocturnal urinary continence, by way of a demonstration involving a balloon and water out of a tap. The balloon signified the bladder, and the water signified urine and night-time wetting. The aims of retention control training, including increasing the child's maximum functional bladder capacity in terms of voided volumes of urine and retention intervals were explained during this demonstration using child-friendly language. This brief psycho-education was included in the current study to teach an understanding of body mechanics regarding nocturnal enuresis, as many children are unaware of how their bodies function (Ney & Mulvihill, 1985). In addition, the child is given assertion training with psycho-education, where he or she is taught that they are in control (Ney & Mulvihill, 1985). Such demonstrations have been suggested to increase the child's comfort and enjoyment levels (Ney & Mulvihill, 1985). In addition, the information emphasized the learning basis of the intervention method, and the fact that the learning of new skills will take time and patience (Houts, 2010). The researcher was also able to explain the un-intentionality of the child's nocturnal enuresis through this demonstration, helping to encourage the primary caregiver(s) not to attach blame to the child regarding his or her nocturnal enuresis.

The researcher phoned primary caregivers daily throughout the intervention phase. This was to: gather the daily data; resolve any issues in terms of the procedure or recording; offer support and advice; and negotiate a challenging yet achievable time goal for the following

day. Telephone contact gradually reduced to every second or third day, which was dependent on participant proficiency and motivation for completing the recording sheets, and comfort of the primary caregiver(s) with less frequent contact.

Without 14 consecutive dry nights having been achieved following several weeks of retention control training, a progress review was conducted with the child and his or her primary caregiver(s) during the researcher's second home visit. A graph to demonstrate the child's progress throughout his or her baseline and intervention phase was constructed by the researcher. This enabled the child to compare his or her performance over time. A graph was not constructed, however, for children who had not improved. A discussion between the researcher and participants took place, regarding the child's progress and participant willingness regarding implementation of the urine alarm. Following willingness to implement the urine alarm, participants were offered a urine alarm along with a verbal explanation and physical demonstration regarding its use. The researcher ensured that participants understood how to use it, and agreed that the child would use it nightly. The second semi-structured interview was then conducted. Lastly, participants were asked to complete the second water-load test.

Once the child had achieved nocturnal urinary continence, or had reached the intervention end-date without having achieved nocturnal urinary continence, the researcher conducted the third home visit. The third semi-structured interview took place under the same conditions as the first and second, and participants were asked to complete the third water-load test. For children who had achieved nocturnal urinary continence, the participants were asked to discontinue intervention. To pre-empt demoralization related to relapses, participants were advised that relapses might occur. If the child had not achieved nocturnal urinary continence

by the intervention end-date, participants were advised that the management of nocturnal enuresis does take time, and it does take longer for some children than for others. They were then given the option of an additional service that they could undertake. Participants were encouraged to contact the researcher for support or advice at any time. Lastly, the researcher collected the completed recording sheets and any borrowed materials.

Follow-up data. Primary caregivers were asked to record the child's wet and dry nights for 15 days, following the intervention end-date or once nocturnal urinary continence had been achieved. The researcher then contacted the primary caregivers following completion of the 15 days, in order to record this data. If the child had already achieved nocturnal urinary continence, yet had demonstrated two or more wetting episodes during the 15 days of follow-up, this was considered to be a relapse (Fielding, 1980) and the option of an additional service was offered.

Materials and Apparatus

Recording sheets were administered to participants. Also administered was a standard 60-minute kitchen timer to monitor retention intervals, and two 500ml beakers calibrated in 50ml units. One beaker was to measure the volume of liquid the child ingested during the retention control training practice sessions, and the other was to measure the child's volume of voided urine. Following the retention control training-phase, participants were issued with a standard urine alarm.

Data Analysis

The researcher utilized both quantitative and qualitative procedures to analyse the data. Recorded data regarding the number of wet nights throughout the duration of the current

study were graphed, and water-load test data were tabulated. An inductive analysis was undertaken (Thomas, 2006) where all semi-structured interviews were transcribed verbatim and then coded into emergent themes and concepts, following multiple readings of the raw data. To address concerns regarding researcher subjectivity, a second coder was utilized to ensure the validity of emergent themes. Quotations were selected from the interviews, which illuminated these themes and concepts, and data could be classified under more than one theme.

CHAPTER 4

RESULTS

Quality of the Data

All participants stayed in the current study, and five out of the six children undertook both interventions offered. None of the children gathered retention control training data on all days. Nathan missed 10 days, Samuel missed 20 days, Simon and Peter missed 3 days each, while Jane and Thomas missed 16 and 17 days respectively. The children's primary caregivers reported that it was too difficult to carry out the retention control training practice sessions every day due to a hectic family lifestyle. In addition, Peter's retention control training practice session data had been misplaced for 24 days of his treatment. Thomas's use of the urine alarm was disrupted initially for 27 days due to false alarms, and he was given two replacement alarms before problems ceased. Lastly, recording continued throughout the summer holidays, when all children went away for a holiday. During this time, Jane and Thomas did not adhere to the intervention method.

Number of Wet Nights

Number of wet nights across children. Figure 2 presents the number of wet nights for each child, using a multiple baseline across-individuals design (Watson & Workman, 1981). Although primary caregivers recorded data every morning throughout participation in the current study, Figure 2 collapse the daily data into the number of wet nights per 5-day epoch. Both large and small urine spots were counted as a wet night. The number of wet nights were calculated throughout the baseline, intervention, and follow-up phase, and data was graphed

using Microsoft Excel. Five out of the six children demonstrated decreases in the number of their wet nights throughout the intervention phase, where four out of the six children achieved nocturnal urinary continence. During retention control training-only: one out of the six children achieved nocturnal urinary continence, three out of the six children decreased the number of their wet nights, and two children failed to respond. The addition of the urine alarm enabled a further three children to achieve nocturnal urinary continence. These improvements were maintained during the follow-up phase.

Number of wet nights for each child. Figure 2 shows that Jane was wet for 5 out of the 5 nights during baseline. Jane undertook retention control training-only for 50 days. As she had continued to wet nightly, the urine alarm was implemented for a further 55 days, although retention control training was discontinued for the last 25 of those days. Jane had demonstrated increases in her voided volumes of urine and retention intervals throughout the intervention phase (see Table 2), yet she had continued to wet nightly by the intervention end date. Jane was wet for 15 out of the 15 nights during follow-up.

Nathan was wet for 3 out of the 5 nights during baseline. Nathan undertook retention control training-only for 53 days before implementing the urine alarm. Despite an overall decrease in the number of his wet nights throughout the intervention phase, Nathan failed to achieve nocturnal urinary continence by the intervention end date 76 days later. Nathan was wet for 1 out of the 15 nights during follow-up.

Samuel was wet for 1 out of the 5 nights during baseline. Samuel undertook retention control training-only for 48 days. During this time, he demonstrated an initial increase in the number of his wet nights, to then achieve 13 consecutive dry nights. Following this, Samuel's wet nights continued to fluctuate with a range of 0-3 wet nights per 5-day epoch. The urine

alarm was then implemented for Samuel, and he achieved nocturnal urinary continence 31 days later. Samuel was wet for 1 out of the 15 nights during follow-up.

Thomas was wet for 9 out of the 10 nights during baseline. Thomas continued retention control training-only for 34 days, where he had continued to wet nightly during this time. Following 58 more days using the urine alarm-only, Thomas achieved nocturnal urinary continence. Thomas was wet for 0 out of the 15 nights during follow-up.

Simon was wet for 7 out of the 15 nights during baseline. Simon continued retention control training for 35 days before implementing the urine alarm. Following 40 more days using the urine alarm, Simon achieved nocturnal urinary continence. Simon was wet for 0 out of the 15 nights during follow-up.

Peter was wet for 4 out of the 15 nights during baseline. Peter undertook retention control training throughout the whole intervention phase of 91 days. He then discontinued retention control training at this point, as he had achieved nocturnal urinary continence. Peter was wet for 1 out of the 15 nights during follow-up.

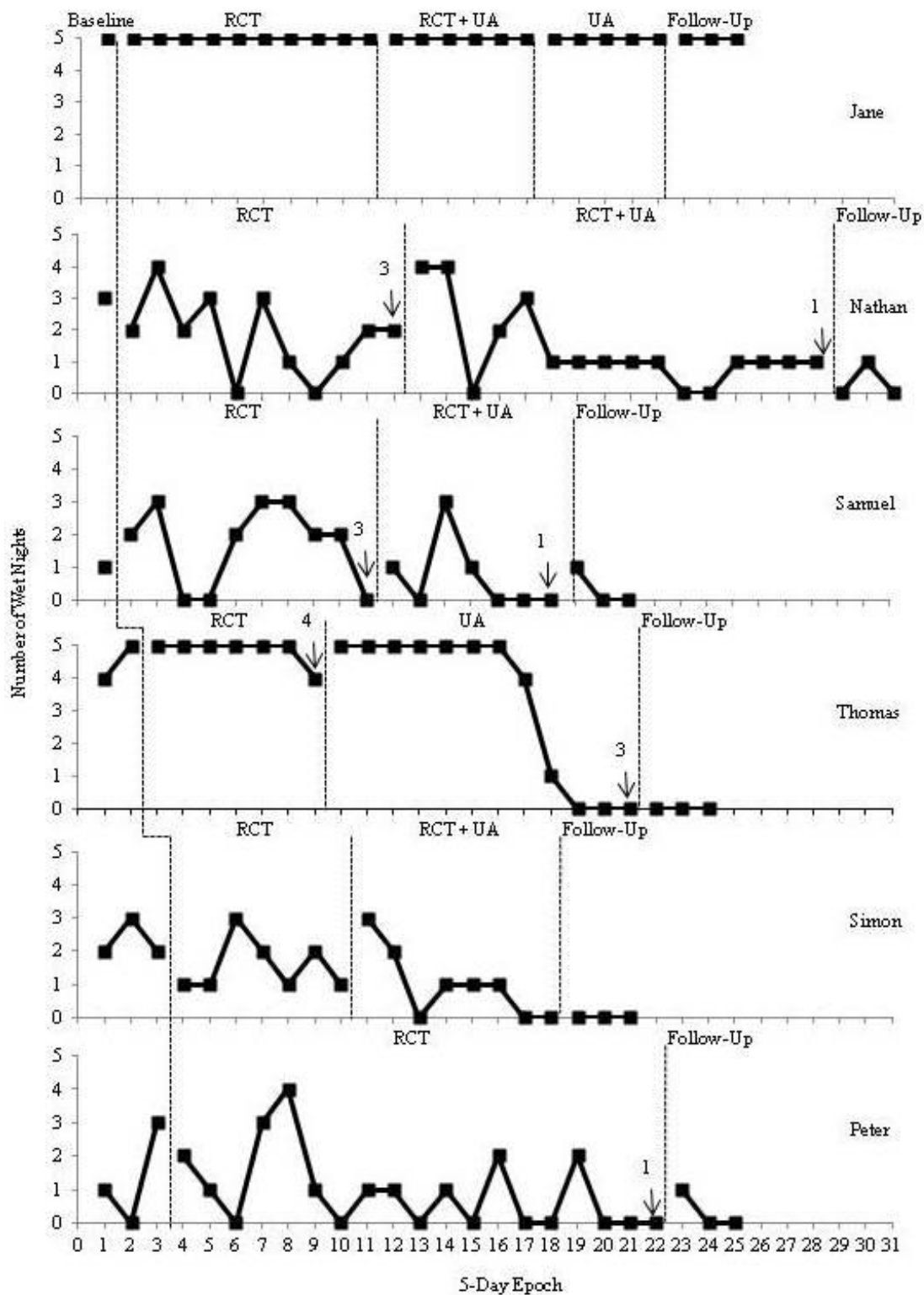


Figure 2. Number of wet nights per 5-day epoch throughout the baseline, intervention, and follow-up phase.

Note. RCT = retention control training; UA = urine alarm; 1 = data recorded out of 1 day; 3 = data recorded out of 3 days; 4 = data recorded out of 4 days.

Maximum Functional Bladder Capacity

Maximum functional bladder capacity across children. Table 2 displays the water-load test data, which demonstrates changes in maximum functional bladder capacity during baseline and post-intervention. Expected linear increases in voided volumes of urine were evident for Jane, Nathan, and Peter only. In addition, expected linear increases in retention intervals were evident in Peter only.

Maximum functional bladder capacity for each child. Table 2 shows that Jane's voided volumes of urine increased from 180 millilitres at baseline to 210 millilitres post-urine alarm, whereas her retention intervals showed an initial increase from 3 minutes at baseline to 20 minutes post-retention control training, and then a decrease to 17 minutes post-urine alarm.

Similarly, Nathan's voided volumes of urine increased from 190 millilitres at baseline to 320 millilitres post- retention control training and urine alarm, whereas his retention intervals showed an initial increase from 7 minutes at baseline, to 45 minutes post-retention control training and urine alarm.

Samuel's voided volumes of urine increased from 300 millilitres at baseline to 400 millilitres post-retention control training, to then return to 300 millilitres post-retention control training and urine alarm. Samuel's retention intervals decreased from 47 minutes at baseline to 22 minutes post-retention control training and urine alarm.

Thomas's voided volumes of urine decreased from 240 millilitres at baseline to 125 millilitres post-urine alarm, whereas his retention intervals increased from 10 minutes at baseline to 15 minutes post-retention control training, to then return to the baseline retention interval post-urine alarm.

Simon's voided volumes of urine increased from 300 millilitres at baseline to 400 millilitres post-retention control training and urine alarm, to then decrease to 265 millilitres post-retention control training. In addition, Simon's longest retention interval of 63 minutes was recorded at baseline.

Peter's maximum functional bladder capacity increased between baseline and post-retention control training, both in terms of his voided volumes of urine (i.e., from 297 millilitres to 420 millilitres) and retention intervals (i.e., from 11 minutes to 35 minutes).

Table 2

Changes in Maximum Functional Bladder Capacity

	Jane		Nathan		Samuel		Thomas		Simon		Peter	
Phase	ml	mins	ml	mins	ml	mins	ml	mins	ml	mins	ml	mins
Baseline	180	3	190	7	300	47	240	10	300	63	297	11
Post-RCT	205	20	250	45	400	25	230	15	265	3	420	35
Post-RCT + UA	-		320	45	300	22	-		400	50	-	
Post-UA	210	17	-		-		125	10	-		-	

Note. ml = millilitres (in terms of voided volumes of urine); mins = minutes (in terms of retention intervals); RCT = retention control training; UA = urine alarm.

Children's Experiences of Nocturnal Enuresis and Attributions for the Therapeutic Outcome

The themes and concepts are as follows:

1. Emotions.

Embarrassment. One child said *I'm embarrassed* when describing how they feel while others talk about their nocturnal enuresis.¹ Four children described going on school camps to be difficult, because of their nocturnal enuresis. Sleepovers were also reported to be difficult because of this. For example, one child said *I always worry. Like if you share a double bed, and you wet it they will know*, another child said *I can't do sleepovers cos I'm too embarrassed*, and another said *I was too scared to have a sleepover cos of my bedwetting*.

Isolation. During their first interview, the children overwhelmingly described attempts to keep their nocturnal enuresis a secret from peers. For example, one child said *trying my friends not to see* and another child said *I don't really want my friends and stuff knowing that I wear pull-ups*. Nocturnal enuresis appeared to prevent one child from enjoying participation in sleepovers with peers, as they said *I don't like staying the night in case I do*. Similarly, when asked what managing nocturnal enuresis would mean to them, one child said *that I can go to my friend's houses*.

However, the children appeared to benefit from the knowledge that they are not the only child with nocturnal enuresis. For example, when asked what it is like to know that a peer has nocturnal enuresis, one child said *good, not just me*. Furthermore, participation in the current study appeared to have normalised the children's experience of having nocturnal enuresis. When describing how they felt about their nocturnal enuresis when they first met the researcher, one child said *I used to think it was really embarrassing*.

Lived experiences. One child described their nocturnal enuresis as *like always cold in the nights and you can't really sleep in it, like I can, but it's smelly and try and not drink but my*

¹ The gender neutral pronouns "they", "their", and "them" are used here to further disguise the identity of the children.

throat really needs water, and my body. The children described worrying about their nocturnal enuresis, one child found having nocturnal enuresis to be *extremely hard* and another child found it to be *quite difficult*. One child described their nocturnal enuresis as *kind of sad* and another described it as *annoying*. This child described the experience of feeling the wetness on their bed as *quite scary* and similar to *an electric shock on my bed*. In all three interviews, one child described having *a sore bottom* because of their nocturnal enuresis. During their first interviews, three children described a desire and hope that their nocturnal enuresis will be managed as a result of their involvement in the current study. Moreover, during their first interview, one child described the experience of having nocturnal enuresis as *very uncomfortable* and the prospect of managing it as *really nice* and *I could have sleepovers and go on school camps, and I wouldn't be embarrassed and life would be better*.

Primary caregiver concerns. Some children described their primary caregiver's as having negative feelings regarding their nocturnal enuresis. For example, one child imitated their primary caregiver sighing in exasperation, and feeling *a little bit frustrated* when they have a wet night. They described feeling *sad* as a result of this. Furthermore, this child described their primary caregiver asking them why they still wet the bed, which was *quite difficult* for them. During their first interview, one child stated *every time at XX's I always; I have to pay pocket money when I wet the bed*. Furthermore, during their third interview, this child described *not being yelled at and stuff* and *my XX feels really happy* that they had achieved nocturnal urinary continence.

2. Before and after.

Fluency and non-verbal communication. One child frequently responded to questions by saying *I don't know* during all three interviews. Children often displayed a lack of the ability to articulate their thoughts into sentences. For example, when asked what becoming dry would mean to them, one child said *Um. Think. Good um. About those things um.* In addition, this child said *I know there's something in my head but I don't know what it is.*

Most of the children were eager and forthcoming to disclose information during the interviews. However, one child displayed a reticence to talk during their first interview. For example, they replied *Mmm* (looking down), or simply remained silent in response to questions posed on six occasions. However, during their second interview, they displayed an increased freedom to talk, as evidenced by their responses to every question.

Understanding of causes for nocturnal enuresis. During their first interview, the children were overwhelmingly uncertain as to the cause of their nocturnal enuresis. For example, three children replied *I don't know*. Consequently, when asked during their second interview, the children provided varying responses. For example, one child said *your bladders really loose*, another child said *maybe the bladder that's not too strong muscle* (sic), and another said *your bladder can't hold on*.

Understanding of causes for the management of nocturnal enuresis. During their second interviews, the children were also overwhelmingly uncertain as to the cause for the decrease in their number of wet nights. For example, two children frequently replied *I don't know* to such questions. However, one of these children suggested that retention control training would not be effective in managing nocturnal enuresis (i.e., *it's supposed to help me hold on to urine although I don't know how that will help me hold on if I'm asleep*). Whereas, the

other child suggested that retention control training was effective (i.e., *cos if you want to go to toilet in the night, then you can try and hold*).

The children displayed a shift in their understandings during the third interviews. Three children attributed their achievement of nocturnal urinary continence to retention control training. In addition, two children described retention control training to have helped them reduce their volume of urine voided during sleep. In addition, two children attributed their achievement of nocturnal urinary continence to the researcher's advice and assistance as well. One child also attributed it to visiting the toilet more frequently, another child also attributed it to *minding myself not to drink water* and another child also attributed it to *not drinking so much before I go to bed*. Lastly, one child described holding their stomach at night time as a method to manage their nocturnal enuresis during all three interviews.

None of the children mentioned the urine alarm as a cause for their success, despite the achievement of nocturnal urinary continence in three out of the five children who used it. However, when prompted, the children's experiences of the urine alarm were not favourable. For example, when asked how much they thought the urine alarm had helped, one child said *mmm middle*. Another child said *mmm not really*, and another said *no, it only went off once and I had already pissed the bed*.

Internal and external control. The children frequently described nocturnal enuresis as something that was out of their control. When asked whether they thought that they could manage their nocturnal enuresis during the first interview, one child said *no*. Another child said that nocturnal enuresis was *out of my control* and *something that happens to me*. One child described having a dry night as *because of luck*. Furthermore, another child described the increase in their dry nights as *something that just happened* and *it's kind of a mystery*.

3. Empowerment.

During the second and third interviews, the children demonstrated a sense of empowerment, as opposed to the embarrassment and isolation they described during their first interview. For example, one child said *I used to think it was really embarrassing and lots of people do it*. In response to having been asked what they thought about the decrease in the number of their wet nights, one child said *it's great*, another child said that it was *exciting*, and another child described feeling *better* as a result of this. As opposed nocturnal enuresis being out of their control, as described in their first interviews, one child exclaimed that they *can do it* during their second interview, and after having achieved nocturnal urinary continence, another child said *I made a big achievement*.

During their second interview, one child described feeling *confident* about managing their nocturnal enuresis, whereas they described feeling *not that confident* during their first interview. Furthermore, another child described feeling *very confident* during their second interview and *not really confident* during their first. Moreover, during the third interviews, one child said *I'm feeling happy*, and another child said that they were *way happier*.

Lastly, some children revealed an understanding of the greater consequences of their participation in the current study regarding children who may have nocturnal enuresis in the future. For example, one child described recording data as making *better exercises for the people that have bedwetting in the future*. In addition, one child's advice for a child with nocturnal enuresis in the future was to *do the toilet chart thing, hold on for as long as you can during the day*.

CHAPTER 5

DISCUSSION

Summary of the Aims and Results

The aims of the current study were to: 1) examine the effectiveness of retention control training, and the urine alarm if necessary, for the management of nocturnal enuresis in six 8 to 12 year-old children; and 2) explore these children's attributions for the therapeutic outcomes of the intervention method regarding their nocturnal enuresis.

Overall, results suggest that retention control training was insufficient for the management of nocturnal enuresis in five out of the six children. One male child achieved nocturnal urinary continence, and three of the remaining five children demonstrated decreases in the number of their wet nights with retention control training. There were also four anecdotal reports where retention control training was attributed as the cause for the achievement of nocturnal urinary continence, and two anecdotal reports that retention control training was the cause for the decrease in voided volumes of urine at night time. Despite the increased intervention length of retention control training used in the current study, compared to intervention lengths of previous studies, fewer children achieved nocturnal urinary continence, and the child who did, did not do so as quickly (Kimmel & Kimmel, 1970; Miller, 1973).

Overall findings regarding children's maximum functional bladder capacity in response to retention control training were contradictory, where only one child demonstrated an increase in their maximum functional bladder capacity with the achievement of nocturnal urinary continence. For example, Peter demonstrated a consistent increase in his voided volumes of

urine and retention intervals, and he achieved nocturnal urinary continence with retention control training. These increases are consistent with the finding that retention control training helps children to increase their bladder capacity (Carr, 1999; Doleys & Wells, 1975). However, two children who did not achieve nocturnal urinary continence (Nathan and Jane), also demonstrated a consistent increase in their voided volumes of urine. This finding is consistent with contradictory previous research, which has suggested that increasing an enuretic child's maximum functional bladder capacity does not necessarily manage their nocturnal enuresis (Doleys et al., 1977; Doleys & Wells, 1975; Fielding, 1980; Houts, 1987). In fact, Thomas and Simon's voided volume of urine decreased between baseline and post-retention control training, despite their achievement of nocturnal urinary continence. This suggests that a mechanism, which remains to be identified, may have been operating during intervention to account for these differences.

The results of the current study add to the already-accumulated findings for the urine alarm as an effective intervention for nocturnal enuresis (Brown, Pope, & Brown, 2010). For example, four out of the five children who used the urine alarm demonstrated a decrease in the number of their wet nights, as well as an increase in the number of their consecutive dry nights. In addition, three of those five children achieved nocturnal urinary continence.

The interviews revealed these children's negative experiences of having nocturnal enuresis. Nocturnal enuresis was found to disrupt these children's everyday activity, from the cold feeling upon waking, to the fear of peers discovering their nocturnal enuresis. Three children described sleepovers, and four children described school camps to be difficult experiences for them. These findings are consistent with those of Butler, Redfern, and

Holland (1994), in that children feel unable to sleepover at a friend's house, and often fear being discovered as a bed-wetter.

The interviews also indicated that children attributed the following factors to be causes for their success in the achievement of nocturnal urinary continence: the intervention of powerful others (i.e., the researcher's assistance), unknown controllability (i.e., *I don't know* response), and particularly, the techniques used during the retention control training practice sessions. Attribution findings also revealed that the inclusion of brief psycho-education appeared to have influenced these children's attributions, as they described features of the urinary system as accounting for their success or failure in the management of their nocturnal enuresis. However, these descriptions were limited, and often revealed somewhat inaccurate representations.

Factors Influencing the Achievement of Nocturnal Urinary Continence

Factors regarding the implementation and application of retention control training may have compromised the children's achievement of nocturnal urinary continence. All children missed a number of retention control training practice sessions, which may have limited its ability to manage the children's nocturnal enuresis. In addition, a discussion with the primary caregivers of Jane and Thomas resulted in the decision for them to use the urine alarm-only (as a hectic family lifestyle meant that the daily practice sessions were too difficult to carry out). As a result, these children were not given the opportunity to experience the full effects of retention control training. During the interviews, five children attributed retention control training as causing the reduction in the number of their wet nights or the volume of urine voided at night time. Moreover, as the number of wet nights decreased with retention control

training in four out of the six children, an extension of the intervention length further may have enabled the achievement of nocturnal urinary continence in these children.

The achievement of nocturnal urinary continence with retention control training may have been influenced by factors including age and number of baseline wetting episodes. For example, Peter was 12 years of age at the beginning of the current study, whereas the other children ranged from 8 to 10 years of age. Peter's older age suggests that his developmental level may have enabled him to carry out the retention control training practice sessions more efficiently and independently. It also may have influenced his achievement of nocturnal urinary continence, as the prevalence of nocturnal enuresis decreases with age (Feehan, McGee, Stanton, & Silva, 1990). Lastly, Peter demonstrated few wet nights throughout baseline. For example, Peter wet 4 out of 15 nights, which may have enabled nocturnal urinary continence to have been achieved more easily.

Contrary to Peter, Jane's failure to achieve nocturnal urinary continence may have been influenced by factors beyond the scope of the study. This may have been associated with her inability to awaken to the urine alarm sound, and as she was reported to be a *deep sleeper* by her primary caregiver (Butler, 2008). Intervention failure has also been associated with: family distress; lack of motivation; or behavioural or psychiatric problems (Devlin & O'Cathain, 1990). As Jane's family concerns were revealed during the current study, upon reflection, it is likely that Jane did not fit the inclusion criteria. These concerns should have been addressed prior to the implementation of intervention for nocturnal enuresis (Mellon & Houts, 2006). Therefore, her results should be excluded as a reliable estimate of the effectiveness of retention control training and the urine alarm for nocturnal enuresis. Following a discussion with Jane and her primary caregiver at the intervention end-date, a

decision was made to discontinue use of the urine alarm, and a referral was made for Jane to be seen at an appropriate service.

Factors Influencing Attributions

The children's statements during the interviews may have been influenced by unknown factors. For example, a child may have repeated a statement that they had heard exclaimed by a primary caregiver. The children frequently replied *I don't know* in response to the researcher's questions. This suggests that the children: may not have understood the question; were unable to articulate their feelings or understandings; would have preferred to ignore the question; or were too embarrassed to reveal their feelings or understandings to the researcher. One child's reticence to talk during the first interview in contrast to their increased freedom to talk during the second and third interviews may have been indicative of: an increased comfort level with the researcher, a developmental maturation during this period of time, and/or the decrease in the number of their wet nights.

Limitations of the Current Study

Due to individual family circumstances, participants did not carry out the intervention method identically. In addition, hectic family lifestyles meant that participants did not undertake as many retention control training practice sessions as they could have, and this resulted in the removal of retention control training from the intervention method for Jane and Thomas. The increased intervention length of retention control training in the current study may have been disheartening for Jane and Thomas as no improvements were observed for both children during this phase, although an extension of the intervention length further may have enabled their achievement of nocturnal urinary continence. Time constraints in the

current study meant that long-term follow-up of 3, 6, and 12 months would have been preferable, yet were not possible.

Two children attributed reducing their liquid intake as a cause for their success in the achievement of nocturnal urinary continence. However, throughout the current study, the researcher discouraged participants from reducing the child's liquid intake, as this has been found to prolong enuresis (Butler, 2004). Therefore, adherence or non-adherence to the researcher's advice may have been a variable that affected the current study's results. Lastly, further experience in clinician interviewing techniques may have resulted in the researcher eliciting more information from the children.

Recommendations for Future Research

In terms of the examination of retention control training as an intervention for nocturnal enuresis, some of the limitations outlined in the current study may be minimized or eliminated in future research. An increased intervention length of retention control training would help to discover whether this enables more children to achieve nocturnal urinary continence. In addition, the current study found that participants varied in their ability to implement retention control training. Therefore, an exploration of variables that increase participant motivation and ability to implement retention control training would be valuable to ensure the increased likelihood of success with retention control training. This may enable the development of more thorough interview questions in order to screen participants for whom retention control training may be difficult to implement, which would be helpful for general practitioners and psychologists to use.

Moreover, it was suggested that the increase in Peter's maximum functional bladder capacity and his achievement of nocturnal urinary continence with retention control training may have been influenced by his age and few baseline-wetting episodes. As this study explored factors that may have influenced the success of retention control training, it would be useful to examine more thoroughly whether these factors enable the achievement of nocturnal urinary continence in other children. A useful future study would compare the effectiveness of retention control training in children of a similar age and number of baseline wetting episodes to Peter, with children of a different age and different number of baseline wetting episodes. This would help to further inform general practitioners and psychologists in terms of intervention recommendations for children presenting with or without these factors.

The current study also explored these children's attributions for the therapeutic outcome of the intervention method regarding their nocturnal enuresis. As an original idea, this proved to be interesting. An exploration to compare children's experiences and attributions of different interventions would be an interesting extension of the current study.

Although psycho-education was not directly assessed in the current study, it appeared to have influenced these children's attributions, because descriptions of the urinary system were introduced during interviews following psycho-education. Therefore, an exploration of the influence of psycho-education versus no psycho-education on children and primary caregiver attributions for the therapeutic outcome of the intervention method regarding nocturnal enuresis may be an interesting future topic. It is of interest as to whether psycho-education will influence the management of nocturnal enuresis or not. In addition, as the children's descriptions were limited and not completely accurate, a recommendation for future clinical

practice is to deliver clear and thorough psycho-education, and to ensure that the child and his or her primary caregivers have accurate understandings.

If, prior to the implementation of intervention for nocturnal enuresis, clinicians: inform, motivate, and encourage primary caregivers, this may help to increase the understanding of their child's experience of having nocturnal enuresis. Using a cognitive behavioural therapy approach, the mentality of primary caregivers may shift from a negative conceptualisation of nocturnal enuresis, where punishment may be used to manage the child's nocturnal enuresis, to a positive conceptualisation, where primary caregivers become empathetic towards the child regarding their nocturnal enuresis. This may increase: intervention compliance, intervention persistence, and reduce participant dropout. Furthermore, it may also: enable the child's nocturnal enuresis to have the best chance of becoming managed, give the child a positive intervention experience, and foster parent-child relationships. Therefore, a study of this topic may benefit the wellbeing of future enuretic children and their families.

Implications for Professional Practice

The underlying aim of the current study was to offer enuretic children an intervention with the intention of it managing their nocturnal enuresis, while giving them a positive intervention experience where they had a sense of control. Five children attributed the retention control training techniques to be the cause for their success in achieving nocturnal urinary continence or reducing their voided volumes of urine during sleep. In addition, one child described these techniques as advice that they would give to another enuretic child. No children attributed the cause of their success to the urine alarm, despite the addition of the urine alarm having resulted in nocturnal urinary continence for three of the five children who used it.

The intervention method used in the current study was successful in the management of nocturnal enuresis for four out of the six children. Therefore, the intervention method may have helped these children to manage their nocturnal enuresis, whilst almost certainly having made a positive impact on other areas of their life that may have been compromised due to their nocturnal enuresis, such as their social and emotional well-being. Experiencing intervention failure is likely to add to the already low self-esteem associated with a child's nocturnal enuresis (Moffatt, 1989). As the current study included implementation of the urine alarm if retention control training-only was ineffective, the intervention method avoided the possibility of diminishing the child's self-esteem. In addition, as it has already been established as an effective intervention (Brown, Pope, & Brown, 2010), the implementation of the urine alarm provided the child with more support in terms of the opportunity to effectively manage their nocturnal enuresis. Lastly, the current study highlights the need for the intervention method to be adaptable to the family's individual needs and circumstances.

Conclusions

Three major conclusions can be drawn from the results of the current study. The first conclusion was that retention control training was effective in the management of nocturnal enuresis for one out of the six children. In addition, four children demonstrated decreases in the number of their wet nights. Furthermore, anecdotal reports for five children suggested that retention control training had helped them to achieve nocturnal urinary continence or reduce their volume of urine voided during sleep. The second conclusion was that implementation of the urine alarm was effective for the achievement of nocturnal urinary continence in three out of the five children who used it.

In light of the different nature of retention control training and the urine alarm, the current study aimed to explore these children's attributions for the therapeutic outcome of the intervention method regarding their nocturnal enuresis. The third conclusion was that brief psycho-education appeared to have influenced the children's attributions. However, overall attribution findings suggested that children attributed their success to the researcher's assistance, unknown factors, and particularly, the techniques used in retention control training.

The current study's findings regarding the achievement of nocturnal urinary continence in one out of the six children with retention control training suggest it to be potentially-effective as an intervention. In addition, five out of the six children attributed retention control training to be a cause for their successful therapeutic outcome. Therefore, the current study's findings in terms of intervention effectiveness and attributions regarding retention control training should help to inform general practitioners and psychologists in terms of intervention recommendations not only in terms of evidence-based practice, but also in terms of positive intervention experiences.

REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington DC: Author.
- Arnell, H., Hjalmas, K., Jagervall, M., Lackgren, G., Stenberg, A., Bengtsson, B., ... Dahl, N. (1997). The genetics of primary nocturnal enuresis: Inheritance and suggestion of a second major gene on chromosome 12q. *Journal of Medical Genetics*, 34, 360-365.
- Azrin, N. H., Sneed, T. J., & Foxx, R. M. (1973). Dry bed: A rapid method of eliminating bedwetting (enuresis) of the retarded. *Behaviour Research and Therapy*, 11(4), 427-434.
- Azrin, N. H., Sneed, T. J., & Foxx, R. M. (1974). Dry-bed training: Rapid elimination of childhood enuresis. *Behaviour Research and Therapy*, 12(3), 147-156.
- Azrin, N. H., & Thienes, P. M. (1978). Rapid elimination of enuresis by intensive learning without a conditioning apparatus. *Behavior Therapy*, 9(3), 342-354.
- Baker, B. L. (1969). Symptom treatment and symptom substitution in enuresis. *Journal of Abnormal Psychology*, 74, 42-49.
- Bennett, G. A., Walkden, V. J., Curtis, R. H., Burns, L. E., Rees, J., Gosling, J. A., & McQuire, N.L. (1985). Pad-and-buzzer training, dry-bed training, and stop-start training in the treatment of primary nocturnal enuresis. *Behavioural Psychotherapy*, 13(4), 309-319.
- Björkström, G., Hellström, A. L., & Andersson, S. (2000). Electro-acupuncture in the treatment of children with monosymptomatic nocturnal enuresis. *Scandinavian Journal of Urology and Nephrology*, 34, 21-26.
- Bloomfield, J. M., & Douglas, J. W. B. (1956). Bedwetting: Prevalence among children aged 4-7 years. *The Lancet*, 267(6927), 850-852.
- Bollard, J., & Nettelbeck, T. A. (1982). A component analysis of dry-bed training for treatment for bedwetting. *Behaviour Research and Therapy*, 20(4), 383-390.
- Bonser, S., Jupp, J., & Hewson, D. (1990). Retention control training for nocturnal enuresis: A case study. *School Psychology International*, 11, 55-62. doi: 10.1177/0143034390111008

- Brown, M. L., Pope, A. W., & Brown, E. J. (2011). Treatment of primary nocturnal enuresis in children: A review. *Child: Care, Health and Development*, 37(2), 153-160. doi:10.1111/j.1365-2214.2010.01146.x
- Butler, R. J. (1991). Establishment of working definitions in nocturnal enuresis. *Archives of Disease in Childhood*, 66, 267-271.
- Butler, R. J. (1998). Annotation: Night wetting in children: Psychological aspects. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 39(4), 453-463.
- Butler, R. J. (2001). Impact of nocturnal enuresis on children and young people. *Scandinavian Journal of Urology and Nephrology*, 35(3), 169-176. doi: 10.1080/003655901750291908
- Butler, R. J. (2004). Childhood nocturnal enuresis: Developing a conceptual framework. *Child and Adolescent Mental Health*, 24(8), 909-931. doi:10.1016/j.cpr.2004.07.001
- Butler, R. J. (2008). Wetting and Soiling. In M. Rutter, D. Bishop, D. Pine, S. Scott, J. Stevenson, E. Taylor & A. Thapar (Eds.), *Rutter's child and adolescent psychiatry*. (5th ed.). (pp. 916-929). Massachusetts: Blackwell Publishing.
- Butler, R. J., Brewin, C. R., & Forsythe, W. I. (1986). Maternal attributions and tolerance for nocturnal enuresis. *Behaviour Research and Therapy*, 24(3), 307-312. doi: 10.1016/0005-7967(86)90190-7
- Butler, R. J., Brewin, C. R., & Forsythe, W. I. (1988). A comparison of two approaches to the treatment of nocturnal enuresis and the prediction of effectiveness using pre-treatment variables. *Journal of Child Psychology & Psychiatry and Allied Disciplines*, 29(4), 501-509. doi: 10.1111/j.1469-7610.1988.tb00740.x
- Butler, R. J., & Heron, J. (2008). An exploration of children's views of bed-wetting at 9 years. *Child: Care, Health and Development*, 34(1), 65-70. doi:10.1111/j.1365-2214.2007.00781.x
- Butler, R. J., & Holland, P. (2000). The three systems: A conceptual way of understanding nocturnal enuresis. *Scandinavian Journal of Urology and Nephrology*, 34(4), 270-277. doi: 10.1080/003655900750042022
- Butler, R. J., & McKenna, S. (2002). Overcoming parental intolerance in childhood nocturnal enuresis: A survey of professional opinion. *British Journal of Urology International*, 89(3), 295-297. doi: 10.1046/j.1464-4096.2001.01774.x
- Butler, R. J., Redfern, E. J., & Holland, P. (1994). Children's notions about enuresis and the implications for treatment. *Scandinavian Journal of Urology and Nephrology*, 163, 39-47.

- Butler, R. J., & Stenberg, A. (2001). Treatment of childhood nocturnal enuresis: An examination of clinically relevant principles. *British Journal of Urology International*, 88(6), 563-571. doi: 10.1046/j.1464-410X.2001.02373.x
- Byrd, R. S., Weitzman, M., Lanphear, N. E., & Auinger, P. (1996). Bed-wetting in US children: Epidemiology and related behaviour problems. *Pediatrics*, 98(3), 414-419.
- Carr, A. (1999). *The handbook of child and adolescent clinical psychology: A contextual approach*. (2nd ed.). London, England: Routledge.
- Cendron, M. (1999). Primary nocturnal enuresis: Current concepts. *American Family Physician*, 59(5), 1205-1214.
- Devlin, J. B., & O'Cathain, C. (1990). Predicting treatment outcome in nocturnal enuresis. *Archives of Disease in Childhood*, 65, 1158-1161. doi: 10.1136/ad.65.10.1158
- Doleys, D. M. (1977). Behavioral treatments for nocturnal enuresis in children: A review of the recent literature. *Psychological Bulletin*, 84, 30-54. doi: 10.1037/0033-2909.84.1.30
- Doleys, D. M., Ciminero, A. R., Tollison, J. W., Williams, C. L., & Wells, K. C. (1977). Dry-bed training and retention control training: A comparison. *Behavior Therapy*, 8(4), 541-548.
- Doleys, D. M., & Wells, K. C. (1975). Changes in functional bladder capacity and bed-wetting during and after retention control training: A case study. *Behavior Therapy*, 6(5), 685-688.
- Du Mars, R. C. (1999). Treating primary nocturnal enuresis: The counselor's role. *College Student Journal*, 33(2), 211-216.
- Feehan, M., McGee, R., Stanton, W., & Silva, P. A. (1990). A 6 year follow-up of childhood enuresis: Prevalence in adolescence and consequences for mental health. *Journal of Pediatrics and Child Health*, 26(2), 75-79. doi: 10.1111/j.1440-1754.1990.tb02390.x
- Fielding, D. (1980). The response of day and night wetting children and children who wet only at night to retention control training and the enuresis alarm. *Behaviour Research and Therapy*, 18(4), 305-317.
- Foxman, B., Valdez, R. B., & Brook, R. H. (1986). Childhood enuresis: Prevalence, perceived impact, and prescribed treatments. *Pediatrics*, 77(4), 482-487.
- Geffken, G., Johnson, S. B., & Walker, D. (1986). Behavioural interventions for childhood nocturnal enuresis: The differential effect of bladder capacity on treatment progress and outcome. *Health Psychology*, 5(3), 261-272.

- Glazener, C. M. A., & Evans, J. H. C. (2009). *Simple behavioural and physical interventions for nocturnal enuresis in children (Review)*. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003637.pub2/pdf/standard>
- Glazener, C. M. A., Evans, J. H. C., & Peto, R. E. (2004). Complex behavioural and educational interventions for nocturnal enuresis in children. *Cochrane Database of Systematic Reviews*. (1): CD004668. doi: 10.1002/14651858.CD004668
- Glicklich, L. B. (1951). An historical account of enuresis. *Pediatrics*, 8, 859-876.
- Goin, R. P. (1998). Nocturnal enuresis in children. *Child: Care, Health and Development*, 24(4), 277-289. doi: 10.1111/j.1365-2214.1998.tb00947.x
- Greaves, M. W. (1969). Hazards of enuresis alarms. *Archives of Disease in Childhood*, 44, 285-286.
- Griffiths, P., Meldrum, C., & McWilliam, R. (1982). Dry-bed training in the treatment of nocturnal enuresis in childhood: A research report. *Journal of Child Psychology and Psychiatry*, 23(4), 485-495. doi: 10.1111/j.1469-7610.1982.tb00092.x
- Grimes, L. (1981). Learned helplessness and attribution theory: Redefining children's learning problems. *Learning Disability Quarterly*, 4, 91-100.
- Hägglöf, B., Andrén, O., Bergström, E., Marklund, L., & Wendelius, M. (1997). Self esteem before and after treatment in children with nocturnal enuresis and urinary incontinence. *Scandinavian Journal of Urology and Nephrology*, 183, 79-82.
- Hallioglu, O., Ozge, A., Comelekoglu, U., Topaloglu, A. K., Kanik, A., Duzovali, O., & Yilgor, E. (2001). Evaluation of cerebral maturation by visual and quantitative analysis of resting electroencephalography in children with primary nocturnal enuresis. *Journal of Child Neurology*, 16, 714-718. doi: 10.1177/088307380101601002
- Harris, L. S., & Purohit, A. P. (1977). Bladder training and enuresis: A controlled trial. *Behaviour Research and Therapy*, 15(6), 485-490.
- Heider, F. (1958). *The psychology of interpersonal relations*. Hillsdale, New Jersey: Wiley.
- Hilt, L. M. (2004). Attribution retraining for therapeutic change: Theory, practice, and future directions. *Imagination, Cognition and Personality*, 23(4), 289-307.
- Houts, A. C. (1987). Children and enuresis. In A. Thomas & J. Grimes (Eds.), *Children's needs: Psychological perspectives* (pp.194-201). Washington, DC: National Association of School Psychologists.

- Houts, A. C. (2010). Behavioral treatment for enuresis. In J. Weisz, & A. Kazdin. *Evidence-based psychotherapies for children and adolescents* (2nd ed.). New York, NY: The Guilford Press.
- Houts, A. C., Berman, J. S., & Abramson, H. (1994). Effectiveness of psychological and pharmacological treatments for nocturnal enuresis. *Journal of Consulting and Clinical Psychology*, 62(4), 737-745.
- Houts, A. C., Peterson, J. K., & Whelan, J. P. (1986). Prevention of relapse in full-spectrum home training for primary enuresis: A components analysis. *Behavior Therapy*, 17(4), 462-469.
- Järvelin, M. R., Moilanen, I., Vikeväinen-Tervonen, L., & Huttunen, N-P. (1990). Life changes and protective capacities in enuretic and non-enuretic children. *Journal of Child Psychology and Psychiatry*, 31(5), 763-774. doi: 10.1111/j.1469-7610.1990.tb00816.x
- Johnson, S. B. (1980). Enuresis. In R. Daitzman (Ed.), *Clinical behavior therapy and behaviour modification* (Vol. 1, pp. 81-142). New York, NY: Garland.
- Kajiwara, M., Inoue, K., Kato, M., Usui, A., Kurihara, M., & Usui, T. (2006). Nocturnal enuresis and overactive bladder in children: An epidemiological study. *International Journal of Urology*, 13, 36-41. doi: 10.1111/j.1442-2042.2006.01217.x
- Kawauchi, A., Imada, N., Tanaka, Y., Minami, M., Watanbe, H., & Shirakawa, S. (1998). Changes in the structure of sleep spindles and delta waves on electroencephalography in patients with nocturnal enuresis. *British Journal of Urology*, 81, 72-75. doi: 10.1046/j.1464-410x.1998.00012.x
- Kelley, H. H., & Michela, J. L. (1980). Attribution theory and research. *Annual Review of Psychology*, 31, 457-501.
- Kimmel, H. D., & Kimmel, E. C. (1970). An instrumental conditioning method for the treatment of enuresis. *Journal of Behavior Therapy and Experimental Psychiatry*, 1(2), 121-123.
- Kosar, A., Arikan, N., & Dincel, C. (1999). Effectiveness of oxybutynin hydrochloride in the treatment of enuresis nocturna: A clinical and urodynamic study. *Scandinavian Journal of Urology and Nephrology*, 33(2), 115-118. doi: 10.1080/003655999750016096
- Longstaffe, S., Moffatt, M. E. K., & Whalen, J. C. (2000). Behavioral and self-concept changes after six months of enuresis treatment: A randomized, controlled trial. *Pediatrics*, 105, 935-940.
- Lovering, J. S., Tallett, S. E., & McKendry, J. B. J. (1988). Oxybutynin efficacy in the treatment of primary enuresis. *Pediatrics*, 82, 104-106.

- Lovibond, S. H. (1963). The mechanism of conditioning treatment of enuresis. *Behaviour Research and Therapy*, 1, 17-21.
- Luciano, M., Molina, F., Gomez, I., & Herruzo, J. (1993). Response prevention and contingency management in the treatment of nocturnal enuresis: A report of two cases. *Child & Family Behavior Therapy*, 15, 37-51.
- Lyman, R. D., Schierberl, J. P., & Roberts, M. C. (1988). Enuresis and encopresis: Psychological therapies. In J. L. Matson (Ed.), *Handbook of treatment approaches in childhood psychopathology* (pp. 397-428). New York, NY: Plenum Press.
- Maizels, M., Rosenbaum, D., & Keating, B. (1999). *Getting to dry: How to help your child overcome bedwetting*. Boston, Massachusetts: The Harvard Common Press.
- Marshall, S., Marshall, H. H., & Lyon, R. P. (1973). Enuresis: An analysis of various therapeutic approaches. *Pediatrics*, 52(6), 813-817.
- Mellon, M. W., & Houts, A.C. (2006). Nocturnal enuresis: Evidenced-based perspectives in etiology, assessment and treatment. In J. E. Fisher & W. T. O'Donohue (Eds.), *Practitioner's guide to evidence-based psychotherapy* (pp. 432-441). New York, NY: Springer.
- Mellon, M. W., & McGrath, M. L. (2000). Empirically supported treatments in pediatric psychology: Nocturnal enuresis. *Journal of Pediatric Psychology*, 25(4), 193-214. doi: 10.1093/jpepsy/25.4.193
- Mikkelsen, E. J. (1991). Modern approaches to enuresis and encopresis. In M. Lewis (Ed.), *Child and adolescent psychiatry: A comprehensive textbook* (pp. 583-591). Baltimore, MD: Williams & Wilkins Co.
- Mikkelsen, E. J. (2001). Enuresis and encopresis: Ten years of progress. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40(10), 1146-1158.
- Miller, P. M. (1973). An experimental analysis of retention control training in the treatment of nocturnal enuresis in two institutionalized adolescents. *Behavior Therapy*, 4(2), 288-294.
- Moffatt, M. E. K. (1989). Nocturnal enuresis: Psychologic implications of treatment and nontreatment. *The Journal of Pediatrics*, 114, 697-704.
- Moffatt, M. E. K., Harlos, S., Kirshen, A. J., & Burd, L. (1993). Desmopressin acetate and nocturnal enuresis: How much do we know? *Pediatrics*, 92, 420-425.
- Moffatt, M. E. K., Kato, C., & Pless, I. B. (1987). Improvements in self-concept after treatment of nocturnal enuresis: Randomized control trial. *The Journal of Pediatrics*, 110(4), 647-652.

- Morgan, R. T. T., & Young, G. C. (1975). Parental attitudes and the conditioning treatment of childhood enuresis. *Behaviour Research and Therapy*, 13(2-3), 197-199.
- Morison, M. J., Tappin, D., & Staines, H. (2000). 'You feel helpless, that's exactly it': Parents' and young people's control beliefs about bedwetting and the implications for practice. *Journal of Advanced Nursing*, 31(5), 1216-1227. doi: 10.1046/j.1365-2648.2000.01426.x
- Mowrer, O. H., & Mowrer, W. M. (1938). Enuresis- a method for its study and treatment. *American Journal of Orthopsychiatry*, 8(3), 436-459.
- Muellner, S. R. (1960). Development of urinary control in children: A new concept in cause, prevention and treatment of primary enuresis. *The Journal of Urology*, 84, 714-716.
- Neal, B. W., & Coote, M. A. (1969). Hazards of enuresis alarms. *Archives of Disease in Childhood*, 44, 651.
- Nevéus, T., Läckgren, G., Tuvemo, T., Hetta, J., Hjälmås, K., & Stenberg, A. (2000). Enuresis- background and treatment. *Scandinavian Journal of Urology and Nephrology*, 34, 1-44. doi: 10.1080/003655900750169257
- Ney, P. G., & Mulvihill, D. L. (1985). *Child psychiatric treatment*. Kent, England: Croom Helm.
- Paschalis, A. P., Kimmel, H. D., & Kimmel, E. (1972). Further study of diurnal instrumental conditioning in the treatment of enuresis nocturna. *Journal of Behaviour Therapy and Experimental Psychiatry*, 3(4), 253-256.
- Rajigah, L. S. (1996). Treatment of choice for nocturnal enuresis: Review and recommendations. *Journal of Psychological Practice*, 2(2), 33-42.
- Rittig, S., Knudsen, U. B., Norgaard, J. P., Pedersen, E. B., & Djurhuus, J. C. (1989). Abnormal diurnal rhythm of plasma vasopressin and urinary output in patients with Enuresis. *American Journal of Physiology*, 256(4), 664-671.
- Ronen, T., & Abraham, Y. (1996). Retention control training in the treatment of younger versus older enuretic children. *Nursing Research*, 45(2), 78-82.
- Rushton, H. G., Belman, A. B., Skoog, S. J., Zaontz, M. R., & Sihelnik, S. (1995). Predictors of response to desmopression in children and adolescents with monosymptomatic nocturnal enuresis. *Scandinavian Journal of Urology and Nephrology, Supplement*, 173, 109-111.
- Sacks, S., De Leon, G., & Blackman, S. (1974). Psychological changes associated with conditioning functional enuresis. *Journal of Clinical Psychology*, 30(3), 271-276.

- Scharf, M. B., Pravda, M. F., Jennings, S. W., Kauffman, R., & Ringel, J. (1987). Childhood enuresis: A comprehensive treatment program. *Psychiatric Clinics of North America*, 10(4), 655-666.
- Serel, T. A., Perk, H., Koyuncuoglu, H. R., Koşar, A., Celik, K., & Deniz, N. (2001). Acupuncture therapy in the management of persistent nocturnal enuresis- preliminary results. *Scandinavian Journal of Urology and Nephrology*, 35, 40-43. doi: 10.1080/00365590151030787
- Stalker, H., & Band, D. (1946). Persistent enuresis: A psychosomatic study. *The British Journal of Psychiatry*, 92, 324-342.
- Starfield, B. (1967). Functional bladder capacity in enuretic and non-enuretic children. *The Journal of Pediatrics*, 70(5), 777-781.
- Starfield, B., & Mellits, D. (1968). Increase in functional bladder capacity and improvements in enuresis. *The Journal of Pediatrics*, 72(4), 483-487.
- Stedman, J. M. (1972). An extension of the Kimmel treatment method for enuresis to an adolescent: A case report. *Journal of Behavior Therapy and Experimental Psychiatry*, 3(4), 307-309.
- Steele, R. G., Elkin, T. D., & Roberts, M. C. (2008). *Handbook of evidence-based therapies for children and adolescents: Bridging science and practice*. New York, NY: Springer.
- Stevens, L., & Jones, E. E. (1976). Defensive attribution and the Kelley cube. *Journal of Personality and Social Psychology*, 34, 809-820.
- Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, 27(2), 237-246. doi: 10.1177/1098214005283748
- Turner, R. K. (1973). Conditioning treatment of nocturnal enuresis: Present status. In L. Kolvin., R.C. Mackeith., & S.R. Meadow (Eds.), *Bladder control and enuresis* (pp. 195-210). London, England: Heinemann.
- Von Gontard, A. (1998). Annotation: Day and night wetting in children- a pediatric and child psychiatric perspective. *Journal of Child Psychology and Psychiatry*, 39(4), 439-451. doi: 10.1111/1469-7610.00341
- Warady, B. A., Alon, U., & Hellerstein, S. (1991). Primary nocturnal enuresis: Current concepts about an old problem. *Pediatric Annals*, 20(5), 246-255.
- Warzak, W. J. (1993). Psychosocial implications of nocturnal enuresis. *Clinical Pediatrics*, 32, 38-40. doi: 10.1177/000992289303200109
- Warzak, W. J., & Friman, P. C. (1990). Nocturnal enuresis: A prevalent, persistent, yet curable parasomnia. *Pediatrician*, 17, 38-45.

- Warzak, W. J., & Friman, P. C. (1994). Current concepts in pediatric primary nocturnal enuresis. *Child and Adolescent Social Work Journal*, 11(6), 507-523.
- Watson, P. J., & Workman, E. A. (1981). The non-concurrent multiple baseline across-individuals design: An extension of the traditional multiple baseline design. *Journal of Behavior Therapy and Experimental Psychiatry*, 12(3), 257-259.
- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review*, 92(4), 548-573.
- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York, NY: Springer-Verlag.
- Weiner, B., Frieze, I., Kukla, A., Reed, L., Rest, S., & Rosenbaum, R. M. (1971). Perceiving the causes of success and failure. In E. E. Jones, D. E. Kanouse, H. H. Kelley, R. E. Nisbett, S. Valins & B. Weiner (Eds.), *Attribution: Perceiving the causes of behaviour* (pp. 95-120). Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.
- Weiner, B., Russell, D., & Lerman, D. (1979). The cognition-emotion process in achievement-related contexts. *Journal of Personality and Social Psychology*, 37(7), 1211-1220.
- Yates, A. J. (1970). *Behavior Therapy*. New York, NY: Wiley.
- Zuckerman, M. (1979). Attribution of success and failure revisited: Or the motivational bias is alive and well in attribution theory. *Journal of Personality*, 47(2), 245-287.

APPENDIX A

HUMAN ETHICS COMMITTEE APPROVAL



HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2012/69

24 July 2012

Emily McKenzie
Health Sciences Centre
UNIVERSITY OF CANTERBURY

Dear Emily

The Human Ethics Committee advises that your research proposal "The effects of retention control training and possible urine alarm on attributions for therapy change and the treatment of nocturnal enuresis in 8-10 year old children" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 18 July 2012.

Best wishes for your project.

Yours sincerely

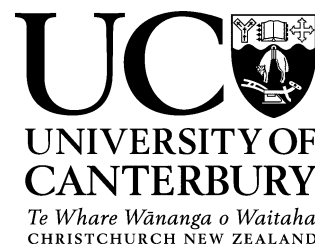
A handwritten signature in black ink, appearing to read 'Michael Grimshaw'.

Michael Grimshaw
Chair
University of Canterbury Human Ethics Committee

APPENDIX B

RECRUITMENT ADVERTISEMENT

Is your child still bedwetting?



To parents/caregivers/whanau,

Is your child at least 8 years of age and has bedwetting problems? Are you interested in a free bedwetting programme as part of a research study at the University of Canterbury? We would love to hear from you.

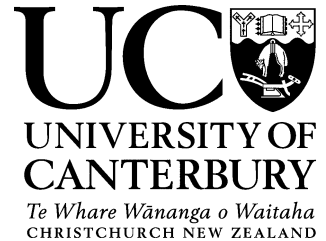
Please contact the researcher (Emily McKenzie) on (022) 0113034.

APPENDIX C

CHILD INFORMATION SHEET

Emily McKenzie
022 011 3034
Email: emm62@uclive.ac.nz

Date



CFPY695: Masters of Science Child and Family Psychology
Attributions for the Therapeutic Outcome and Management of Nocturnal Enuresis

Information Sheet for Children

(For the primary caregiver to read to the child)

Emily is doing a study at the university. She is studying to find out the best ways to help children who wet the bed at night. She is going to work with you and me to help with your bedwetting.

Emily will talk to you about what you think and feel about your bedwetting. When you talk to Emily about this, it will be recorded onto a video tape so that she can remember what you and her talked about. She will do some activities with you to help stop your bedwetting. She will also talk with me about these activities so that I can help too. If your bedwetting has not properly stopped after these activities, you may get a buzzer, which makes a noise during the night if you start to wet the bed, so you can wake up and go to the toilet. Emily will talk to me to make sure that you are okay with using the buzzer.

As you have been selected for Emily's research study, you will be given a code name so that no one will know your name. Your information will be kept private, so that only Emily and her university teachers will see your information. Other people will be able to read Emily's research study on the computer, but they will not know that it was you who was in it. Your information will also be destroyed after five years, so no one else can see it.

Emily will phone us every day to see how we are going with the bedwetting. Emily will talk to me about my final results and she will give me a written copy of these.

If you have any questions, you can talk to us, Emily, her teacher Karyn France (telephone: + 64 03 364-2610, ext 6610; email: Karyn.France@canterbury.ac.nz), or the person in charge, The Chair, University of Canterbury Human Ethics Committee; (human-ethics@canterbury.ac.nz). If you change your mind about being in the study, that is fine too. All you have to do is to tell me, or Emily.

Thank you for helping with the study.

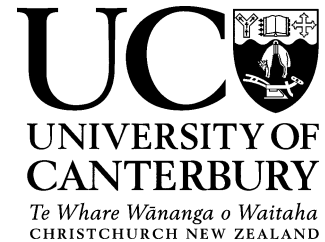
Emily McKenzie

APPENDIX D

PRIMARY CAREGIVER INFORMATION SHEET

Emily McKenzie
Telephone: 022 011 3034
Email: emm62@uclive.ac.nz

Date



Attributions for Therapeutic Outcome and Management of Nocturnal Enuresis

Primary Caregiver Information Sheet

I am a masters student at the University of Canterbury. I am currently studying my masters thesis, where I am interested in finding out the best treatments for nocturnal enuresis (bedwetting) in children aged between 8 and 12 years. I am interested to see if retention control training is sufficient in treating children's nocturnal enuresis, or whether the addition of the urine alarm is required. Retention control training will be used first, and aims to strengthen the muscles involved in bladder control and increase bladder capacity. If this is not sufficient in treating nocturnal enuresis, we will then use retention control training in conjunction with the urine alarm. The length of time for your involvement in this research study will be up to 5 months altogether.

I would like to invite you to be involved in my research study. If you and your child agree to be involved, you will be asked to do the following:

- Record your child's wet nights onto a recording sheet every day throughout the study period.
- Ensure that your child completes the retention control activity every day during the specified length of time.
- Assist your child with retention control training, and possibly the urine alarm if required.
- Be available every evening for a five minute telephone feedback conversation regarding your child's progress.
- Consent to the video recording of your child's interviews around attributions.

Please note that your participation and your child's participation in this study are voluntary. You and your child can withdraw from the study at any time without penalty. If your child does choose to withdraw, I will do my best to remove any information relating to your child, provided this is practically achievable.

I will take particular care to ensure the confidentiality of the information/data gathered from you and your child. It will only be accessed by my two supervisors, Karyn France and Gaye Tyler-Merrick and myself. You and your child will be assigned code names to ensure your confidentiality. I will also take care to ensure you and your child's anonymity in any publication of the findings. My completed thesis is a public document, which can be accessed via the UC library database. All your information/data will be securely stored in password-protected facilities and locked storage at the University of Canterbury for five years following the study. This information will then be destroyed.

The results of this research study may be used to help further inform practitioners when treating patients for nocturnal enuresis.

If you would like to receive a report of this research study, you can request one by contacting me (details above).

If you have any questions about the study, you can contact me (details above) or my supervisor Karyn France (telephone: + 64 03 364-2610, ext 6610; email: Karyn.France@canterbury.ac.nz) at any stage.

My research study has received ethical approval from the University of Canterbury Educational Research Human Ethics Committee. If you have a complaint, you may contact The Chair, The University of Canterbury Human Ethics Committee; (human-ethics@canterbury.ac.nz).

If you understand and agree to take part in my research study, please complete the attached consent form.

I am looking forward to working with you and thank you in advance for your contributions.

Emily McKenzie

APPENDIX E

CHILD CONSENT FORM

Health Sciences Centre

Emily McKenzie
Telephone: (022)0113034
Email: emm62@uclive.ac.nz



Attributions for the Therapeutic Outcome and Management of Nocturnal Enuresis Consent Form for Child

(Please tick each box)

☐ Emily/mum/dad has told me all about the study and I understand what I need to do. I understand that Emily will phone my parents every day to see how my bedwetting is going and I am okay that when I talk to Emily about my bedwetting it will be recorded onto a video tape so that she remembers what we talked about.

☐ I understand that only Emily and her university teachers will see my information and that this information will be kept secure and locked away until it will be destroyed in five years time.

☐ I understand that Emily might write or talk about the study but no one else will know it was me who took part. I understand that other people will be able to read about the research study on the computer, but no one will know that it was me who took part.

☐ I understand that my participation in this study is voluntary and that I can stop being involved at any time and no one will mind. I only have to tell mum, dad or Emily.

☐ Emily will talk to me about the final results. She will give mum and dad a written copy of these.

☐ I understand that I can get more information about this study from Emily (details above), or her university teacher Karyn France (telephone: + 64 03 364-2610, ext 6610; email: Karyn.France@canterbury.ac.nz).

☐ I understand that I can contact The Chair, University of Canterbury Human Ethics Committee; (human-ethics@canterbury.ac.nz) if I have any concerns about the study.

☐ I agree to take part in Emily's research study.

Full name _____

Primary caregiver(s) name _____

Signature _____

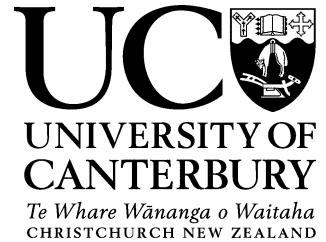
Date _____

Emily McKenzie

APPENDIX F

PRIMARY CAREGIVER CONSENT FORM

Emily McKenzie
Telephone: (022)0113034
Email: emm62@uclive.ac.nz



Attributions for the Therapeutic Outcome and Management of Nocturnal Enuresis Consent Form for Primary Caregiver

(Please tick each box)

- ☐ I have been given a full explanation of this study and have been given an opportunity to ask questions.
- ☐ I understand what will be required of me if I am involved in this study and I consent to the video recording of my child in their interviews on attributions.
- ☐ I understand that my participation in this study is voluntary and that I may withdraw at any stage without penalty.
- ☐ I understand that any information I provide will be kept confidential to Emily and her two supervisors and that any published or reported results will not identify my child or me. I also understand that Emily's completed thesis is a public document, which can be accessed through the UC library database.
- ☐ I understand that all data collected for this study will be kept in locked and secure facilities at the University of Canterbury and will be destroyed after five years.
- ☐ I understand that I can receive a report on the findings of this study. I have provided my email details below for this.
- ☐ I understand that if I require further information I can contact Emily (details above) or her supervisor Karyn France (telephone: + 64 03 364-2610, ext 6610; email: Karyn.France@canterbury.ac.nz).
- ☐ If I have any complaints, I can contact The Chair, The University of Canterbury Human Ethics Committee (human-ethics@canterbury.ac.nz).

By signing below, I agree to be involved in this research study.

Name: _____

Date: _____

Signature: _____

Email Address: _____

Emily McKenzie

APPENDIX G
BASELINE RECORDING SHEET FOR 5 DAYS

Recording sheet for:

Day	Date	Wet/dry	Number of times went to the toilet
1			
2			
3			
4			
5			

APPENDIX H

CHILD RECORDING SHEET

Recording sheet for:

Day:

Wet/dry:

Goal holding on:

Date:

Time need to go to the toilet	Time actually go to the toilet	Time holding on

Time given 2 cups drink	Time need to go to toilet	Time actually go to toilet	Time holding on	Amount of urine (ml)

Time need to go to toilet	Time actually go to toilet	Time holding on

APPENDIX I
PRIMARY CAREGIVER RECORDING SHEET

Recording sheet for:

Date	Wet/dry

APPENDIX J

WATER-LOAD TEST SHEET

Water-load sheet for:

Date:

Weight of child (kg):

Amount of drink given to child (30ml/kg body weight) (maximum 500ml):

Half of drink amount (ml):

Time that child is given drink:

Time need to go to toilet	Time actually go to toilet	Time holding on	Amount of urine (ml)

APPENDIX K

WATER-LOAD TEST INFORMATION SHEET

The following instructions were outlined verbatim to children and primary caregivers, where they were also given a sheet with these written instructions:

Water load information:

After urinating, the child is given a drink amounting to 30ml/kg of the child's body weight (up to 500ml). When the child requests to use the toilet to urinate, the primary caregiver asks the child to hold on for as long as possible. When the child cannot wait any longer, his or her volume of urine is collected in a measuring cup and recorded. If half of the amount the child drunk was voided, discontinue the test.

If less than half the amount the child drunk was voided, continue this procedure (i.e. the child again requests to use the toilet to urinate, the primary caregiver(s) asks the child to hold on for as long as possible and when the child cannot wait any longer, the urine volume is measured). Repeat this procedure until half the amount the child drunk added together has been voided.

APPENDIX L

SAMPLE INTERVIEW QUESTIONS

Questions used in interviews were:

1. How do you feel about your bedwetting now? What is it like? What is the worst/best thing about it? How does it affect you?
2. Tell me now how you think bedwetting happens?
3. Tell me about the things you have done to try to stop your bedwetting? What have you done?
4. Tell me about having a dry night, what is that like?
5. How have you managed to achieve that? What has made the difference?
6. If another child was trying to learn the same things, what would your advice for them be?
7. Do you think any differently about bedwetting as you did when you first met me? What did you think then? What do you think now?
8. How does your family now feel about your bedwetting?